The Wrath of Khong:

Science Fiction, Future Analogies, and Early Military Space Policy

By

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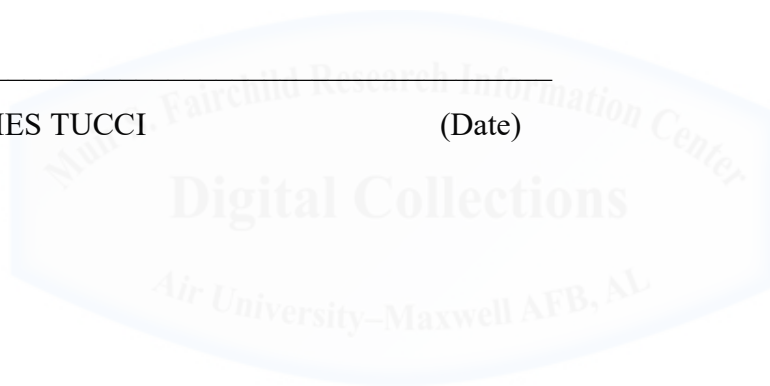Air University

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APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

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DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, the United States Space Force, or Air University.

ABOUT THE AUTHOR

Lieutenant Colonel Bryony Slaughter is a 2006 graduate of the USAF Academy, where she majored in Space Operations. After overcoming the loss of her cadet-built satellite to Elon Musk's Falcon 1 rocket, she began her career in the Air Force as a Space Officer. She has completed a variety of assignments including Space Warning, Missile Defense, Space Situational Awareness, operating the Global Positioning System, deployed as a Space Liaison Officer, Weapon School Instructor, Aide-de-Camp, and prior to attending school was part of the initial cadre for the National Space Defense Center. After SAASS she hopes to transition into the US Space Force.

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ABSTRACT

This paper investigates the role that science fiction had on the early development of military space policy. It examines three science fiction motifs: the concept of space as a frontier, the fear of nuclear apocalypse, and the central theme of human spaceflight. Using Yuen Foong Khong's Analogical Explanation Framework, this paper contends that science fiction of the pulp era assisted policymakers in defining the nature of the situation, providing prescriptions for policy, evaluating moral rightness, and in two of the cases, warning about the dangers of other options. Conversely, this paper assesses that unlike historical analogies, the future analogies or motifs of science fiction did not help to evaluate the stakes or predict the chances of success of a given policy decision. This paper is a timely reminder that when science fiction is used correctly, it is often a helpful tool in investigating and analyzing imaginary future war scenarios. As the next era of space exploration develops, and the US military stands up the Space Force and renews its focus on the protect and defend mission, science fiction provides a pathway for the investigation of new policy alternatives.

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Chapter 1
Science Fiction and Space

The great pioneers of modern rocketry-Tsiolkovsky, Goddard, Oberth, and their successors Korolev, Von Braun, and others-were not inspired primarily by academic or professional interest, financial ambitions, or even patriotic duty, but by the dream of spaceflight. To a man, they read the fantasies of Jules Verne, H.G. Wells, and their imitators, and the rocket for them was only a means to an end.

<div align="right">

Walter McDougall

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In 2018, the cable channel SyFy planned to cancel a show called *The Expanse*, after its third season. However, the CEO of Amazon and its subsidiary space company Blue Origin, Jeff Bezos, intervened to ensure the show's renewal on Amazon's streaming video platform.[1] The show's rescue was instigated through personal intervention by Bezos.[2] Why would a billionaire care that a science fiction show was about to be canceled? First, Bezos is a self-proclaimed science fiction fan who ascribes to the ideas of Gerard O'Neill, author of *The High Frontier* (1976) about the human colonization of space.[3,4] Similarly, Bezos believes that space is the "high frontier," an analogy which harkens back to the days of American manifest destiny on the western frontier. The analogy of the high frontier for Bezos means that space affords ample opportunities for exploration, manufacturing, and colonization.[5] The prospect of the space frontier serves as a means to preserve the pristine nature of the Earth and protect humanity in the case of catastrophe.[6] The television series *The Expanse*, based on the book series starting with *Leviathan Wakes* and its sequels by James S.A. Corey, features a world where space

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[1] Alan Boyle, "Amazon Studios' Boss, Recounts Jeff Bezos' Dinnertime Push to Save 'The Expanse'" *Geekwire*, June 11, 2018, https://www.geekwire.com/2018/amazon-studios-chief-recounts-jeff-bezos-dinnertime-push-save-expanse/, accessed 19 Dec 2019.

[2] Ibid.

[3] Christian Davenport, *The Space Barons: Elon Musk, Jeff Bezos and the Quest to Colonize the Cosmos* (New York: Public Affairs Hachette Book Group, 2018), 68–69.

[4] Gerard O'Neill, *The High Frontier: Human Colonies in Space*, 3rd ed. (Ontari: Apogee Books, 2000). Those that ascribe to O'Neill's views of humans moving out into space colonies are often referred to as "O'Neillians."

[5] Corey Powell, "Jeff Bezos Foresees a Trillion People Living in Millions of Space Colonies. Here's What He's Doing to Get the Ball Rolling," *NBC News*, May 15, 2019, https://www.nbcnews.com/mach/science/jeff-bezos-foresees-trillion-people-living-millions-space-colonies-here-ncna1006036.

[6] Ibid.

colonization is robust and thriving.[7] Another reason that Bezos may have saved *The Expanse* is his goal of increasing the amount of science fiction content on Amazon in an effort to stoke American and international interest in space.[8] Bezos understands that, while he has the necessary financial resources, he still needs scientists, engineers, and prospective passengers or colonists to make his dream a reality. In order to stoke the American public's passion for space, Bezos plans to start by inspiring the nation's youth. In his May 2019 unveiling of Blue Origin's moon lander concept, he "announced plans to encourage children to become more interested in space."[9] Aside from Bezos's love of science fiction, the work he is doing, both in expanding science fiction content on Amazon and through his rocket company, Blue Origin, is cultivating the enthusiasm and the discourse surrounding the prospect of humans living and working in space.

Introduction

Konstantin Tsiolkovsky is often considered the founder of modern rocketry, the first scientist to show, beginning in the late 19th century, that space travel and rocketry were not just works of imagination, but a real possibility. Describing the impetus for his research, he wrote, "I thought of the rocket as everybody else did—just as means of diversion and petty everyday uses. I do not remember exactly what prompted me to make calculations of motions. Probably the first seeds of the idea were sown by that great, fantastic author Jules Verne-he directed my thought along certain channels, then came a desire, and after that a work of the mind."[10] Starting in 1917, the Bolsheviks seized on Tsiolkovsky's research and his potential to turn what was once "escapism for the public…" into "prophesies" of revolution and a future communist utopia.[11] Walter McDougall summarizes the Bolsheviks' efforts saying, "the Soviet Union was the first government to endorse and support the goal of spaceflight."[12] The Soviets did not pursue

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[7] James Corey, *Leviathan Wakes*, The Expanse 1 (Maryknoll, NY: Orbis Books, 2011).
[8] "How Star Trek and Sci-Fi Influenced Jeff Bezos," *Wired*, January 26, 2019, https://www.wired.com/2019/01/geeks-guide-jeff-bezos/.
[9] Kenneth Chang, "Jeff Bezos Unveils Blue Origin's Vision for Space, and a Moon Lander," *New York Times*, May 9, 2019, https://www.nytimes.com/2019/05/09/science/jeff-bezos-moon.html.
[10] Walter McDougall, ...*The Heavens and The Earth: A Political History of the Space Age* (Baltimore and London: The Johns Hopkins University Press, 1997), 20. Direct quoting Tsiolkovsky in "exploration of Cosmic Space with Reactive Devices" *Pioneers of Rocket Technology* (Moscow, 1964) p 54
[11] Ibid., 25–26.
[12] Ibid., 26.

spaceflight for fanciful reasons, but to achieve an idealized society punctuated by the belief that power is, in part, derived from technological superiority.

The Soviet Union was far from the last government to sponsor space for reasons of prestige and lauding its vision of an ideal society, nor the last to highlight its cultural and technical power. The US pursued spaceflight for many of the same reasons. However, there remained roadblocks to beliefs about the use of such activities. In 1954, the Commander of the Navy Bureau of Aeronautics, R.C. Truax, attended a symposium on space travel where he bluntly stated, "There is simply no overwhelming rational reason why we should try to set up a station in space, send a rocket to the moon, or take any other steps along the road towards interplanetary flight."[13] He explained that while there was no immediate military necessity, "if the majority of the people of this country feel the same way [about the necessity of space travel], the arguments of immediate utility are unnecessary."[14] Truax claimed that advocates of space exploration and utilization must "fire the imaginations" of the American people if they wished to see space expansion.[15] Science fiction writers of the 1950s and 1960s, including Arthur C. Clarke, who headlined the symposium where Truax spoke, were attempting that very feat, stoking the American imagination in the hope of a better, more advanced society and future. The inspiring of scientific imagination and cultural perceptions of an ideal society created by science fiction remains ubiquitous to this day.

Science fiction creates dreams of the future, scientists and engineers determine the realm of the possible, and politicians leverage those possibilities for state advantage. Jeff Bezos, the founder of Blue Origin, admits he grew up feeding his mind with a steady diet of Robert Heinlein and Isaac Asimov and "other well-known science fiction authors that persists to this day."[16] Likewise, Elon Musk, the founder of SpaceX, acknowledges he was influenced by "Isaac Asimov's *Foundation* series, a science fiction saga in which a galactic empire falls and ushers in a dark age."[17] These two notable men, who are

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[13] Howard McCurdy, *Space and the American Imagination*, 2nd ed. (Baltimore, MD: Johns Hopkins University Press, 2011), 43.

[14] Ibid., 43.

[15] Ibid., 43.

[16] Davenport, *The Space Barons*, 65.

[17] Rory Carroll, "Elon Musk's Mission to Mars," *The Guardian*, July 17, 2013, https://www.theguardian.com/technology/2013/jul/17/elon-musk-mission-mars-spacex. and Marguerite Ward, "Elon Musk Says Reading This Science-Fiction Classic Changed His Life," *CNBC News*, accessed

enterprising the next generation of space endeavor, are both conscious and proud of the potential that science fiction has to stoke the American imagination regarding space. While Bezos and Musk do not directly generate military space policy, their efforts influence the strategic environment. Bezos and Musk are changing the context of space travel, exploration, and industry from one dominated by the government to an industry driven enterprise. Their admirable efforts do not come without a cost for military strategists. The efforts of SpaceX and Blue Origin introduce significant change into the strategic environment of space, a change to which military policy and strategy must adapt and leverage to remain relevant.

If military planners and strategists are unable or unwilling to comprehend the driving factors and context behind the changes sweeping the political, cultural, and physical landscape of space, the military will find itself hampered with inadequate plans and strategy. If military strategists and planners do not understand the goals and outcomes that civilian sector space giants are imposing on the contextual environment of space, the strategy they develop will likely be incomplete. As strategists, one must not merely react to the changes in the environment, but prepare for future advantage. Luckily, science fiction has already done some of the heavy lifting, proposing potential futures given particular technologies or political postures. The fact that both Bezos and Musk are inspired by science fiction is another boon to using science fiction to analyze future military alternatives. However, strategists must leverage an understanding of science fiction's future political and cultural alternatives, and integrate it with the current political, cultural, and technological milieu to form a strategy that appropriately prepares for a continuing advantage for America's future in space.[18]

America is returning to space, strange as it may sound since, in essence, we never left. Better put then, America is returning to military action in space. The military space program has had relative stability in its major mission sets since the end of the Cold War because activity in the space domain has remained fairly benign when compared to other domains. As the US and other international players revitalize their interest and activity in

December 19, 2019, https://www.cnbc.com/2017/06/06/elon-musk-says-this-science-fiction-classic-changed-his-life.html.

[18] Everett C. Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (London: Frank Cass, 2005), 5.

the space domain, so, too, must the US military reinvigorate its capability to secure and protect various national interests in space. This return to space is due to several factors, the first being the reinvigoration of competition in the space environment led by China and its expansion into space. China views space as a domain of strategic importance; the State Council Information Office of the People's Republic of China stated in a white paper in 2015 that "outer space and cyberspace have become new commanding heights in strategic competition among all parties." Additionally, in 2015 China created the Peoples Liberation Army Strategic Support Force, which is the space, cyber, and electronic warfare element, with a heavy focus on military space programs. The Chinese government has invested heavily in both their civil and military space capabilities over the past decade.[19] The Chinese see expansion in space as essential to their national goals. Another driver of the revitalization of military space is the declining costs of launch. The lowering cost of launch is primarily attributed to Jeff Bezos and Elon Musk's drive to develop cheap and reusable launch systems. Declining launch costs have enabled greater access to space, not just by the American government, but many actors leading to other strategic consequences.

Inspired by the future envisioned by science fiction, entrepreneurs like Musk and Bezos believe so wholeheartedly that the fictional worlds represented in science fiction are possible, that they have invested billions into making the fiction of their youth a reality. Science fiction is inspiring current space development in the civilian sector, which ultimately influences the national government. For example, under the Outer Space Treaty (OST), the US is responsible for the safety and security of space launch as well as any damage caused by any space vehicle certified to launch by the US.[20] The current international interpretation of this law includes both the vehicles themselves and any citizens or passengers on board. The US's responsibility for the vehicles and missions launched by its entrepreneurial enterprises coupled with current military

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[19] Todd Harrison, Kaitlyn Johnson, and Thomas Roberts, "Space Threat Assessment 2019" (Center for Strategic and International Studies, April 2019), 11. Citing a 2015 Chinese White Paper on Space: The State Council Information Office of the People's Republic of China, *China's Military Strategy* (Beijing, China: People's Republic of China, May 2015), http://eng.mod.gov.cn/Press/2015-05/26/content_4586805.htm.

[20] United Nations General Assembly, "Convention on Registration of Objects Launched into Outer Space" (United Nations, 1974), http://www.unoosa.org/pdf/gares/ARES_29_3235E.pdf.

activities and rhetoric regarding China's actions in space could require US military protection Bezos and Musk's missions. Therefore, as the military prepares a strategy to protect this inevitable outgrowth of the space enterprise, its strategists must understand the cultural and political foundations which have shaped the perceptions of the space environment. Science fiction is one aspect that has shaped the cultural and political foundations of the development and policies of the US space enterprise.

What is Science Fiction?

The word fiction has many traceable roots. Most often, the word is credited to the old 15th-century French term, "*ficcioun*: that which is invented or imagined in the mind."[21] However, it also has Latin roots, stemming from the word *fingere,* meaning the "forming, shaping and moulding [sic] elements: the crafting of a narrative."[22] Science, on the other hand, derives from the Latin verb "scio" which means to know, which further developed into its mid-14th century French meaning, "what is known, or the knowledge of something acquired by study."[23] While these two words were used independently for centuries, the term science fiction was not used consistently until the early 1900s. The first actual usage of the term appeared in editorial by Hugo Gernsback "Amazing Stories" magazine in 1926, while its abbreviated version, sci-fi, was not seen until much later, in 1955.[24]

I define the term science fiction as stories of the future which explore potential future societal or political outcomes using future technology or set in a future environment not yet discovered or explored. However, all of these facets of a science fiction tale do not have to be true simultaneously. A science fiction story may explore only the impact of future technology on societal outcomes or it may explore entirely new societal and political contexts, using obscure locations such as the Moon or other planets, and futuristic technology that impacts both the social and political fabric of the nation or

[21] "Fiction," in *Online Etymology Dictionary*, accessed December 19, 2019, https://www.etymonline.com/word/fiction.

[22] Peter Burke, *What Is Cultural History?* (Medford, MA: Polity Press, 2019), 92.

[23] "Science," in *Online Etymology Dictionary*, accessed December 18, 2019, https://www.etymonline.com/word/fiction.

[24]Brian M Stableford, John Clute and Peter Nicholls. "Definitions of SF". The Encyclopedia of Science Fiction edited by John Clute, David Langford, Peter Nicholls and Graham Sleight. London: Gollancz, updated 1 February 2020. Web. Accessed 7 April 2020. <http://www.sf-encyclopedia.com/entry/definitions_of_sf>.

the world. Science fiction authors and fans believe the genre to be set apart from "mundane" fiction in that science fiction is "visionary, a map of the future by means of which fans have a private view of the millennium."[25] In whatever scenario a science fiction tale displays, it must also have elements of relatability for the reader. Thomas Disch in his book, *The Dreams Our Stuff is Made Of*, explains that most science fiction writers attempt to write stories that have a "realism of the future."[26] That is to say, "the worlds they describe and the events they narrate may have a surreal quality at first glance, but as the story unfolds, such surrealities come to have a naturalistic basis in an altered but real world."[27] Additionally, science fiction is often allegorical, leveraging futuristic technology as a fictionalization of a present-day truth.

Science fiction has a deep-rooted tradition in space. Before science fiction was even a term, Lucian of Samosata circa 125 wrote one of the first works of what is now regarded as science fiction, his fictional story includes a journey to the Moon.[28] More contemporarily, H.G Wells and Jules Verne both created fantastic stories revolving around rockets and space travel that inspired some of the earliest modern rocket scientists. The early years of the science fiction genre, roughly between 1929 and 1956, are known as the "pulp era," nicknamed as such because of the cheap paper used to print science fiction stories.[29] Throughout its nascent years, science fiction retained a foundation built on stories of space travel and far away worlds. The ties of science fiction and space are so intertwined that the two have, in some ways, become synonymous, even though plenty of science fiction does not include space.[30] Many science fiction books, even in 2020, bear the 1950s symbol of a rocket ship with Pontiac tail fins to denote the genre, regardless of whether the science fiction is space-related.[31]

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[25] Thomas Disch, *The Dreams Our Stuff Is Made Of: How Science Fiction Conquered the World* (New York: The Free Press, 1998), 140.
[26] Ibid., 218.
[27] Ibid., 218.
[28] John Clute. "Lucian". The Encyclopedia of Science Fiction edited by John Clute, David Langford, Peter Nicholls and Graham Sleight. London: Gollancz, updated 12 August 2018. Web. Accessed 7 April 2020. <http://www.sf-encyclopedia.com/entry/lucian>.
[29] Disch, *The Dreams Our Stuff is Made Of,* 115.
[30] Ibid., 58.
[31] Ibid., 7. Notably, the symbolic rocket ship used by science fiction novels looks remarkably similar to Elon Musk's recent unveiling of Starship One, a nod to the power of symbolism in making space travel a reality.

For purposes of this thesis, hard science fiction refers to those works of science fiction that leverage real or near-real science to give their writing the feeling that it could be true or, at least, a real future possibility. Hard science fiction is generally the source of inspiration for scientists, engineers, and entrepreneurs to pursue the previously impossible with regards to space. Soft science fiction are those works more removed from reality which, "traffic in scientific impossibilities."[32] Soft science fiction is useful in promoting interest and excitement for the space domain but does little in the way of promoting realistic goals or discourse on the future, with a few notable exceptions which are discussed later in the paper. The majority of this thesis deals with hard science fiction and, therefore, will be referred to only as 'science fiction' unless a distinction is necessary for clarity.

Science fiction often employs dichotomous ideas about the future of the world, using contemporary concerns or fears. In one aspect, it promotes ideas of a perfect world and society or utopia. It is worthwhile to note that all utopian ideals, as presented in science fiction, are not the same. However, they generally converge on a sense of morality and community relevant to the milieu of the day and country of origin. The US, for instance, had few, if any, popular science fiction stories in the pulp era that represented communism or socialism as a utopian ideal. A communist utopia would have been an anathema to US ideals at the time, a trend that generally continues in American science fiction to this day.[33] Furthermore, the cultural mores presented in science fiction serve as an artifact of the context of a society at a given time, dissectible for study. On the other hand, science fiction reveals these same societal perspectives through negative futures of an unravelling society in turmoil, in other terms, a dystopia. . It is important to note that the ideas of utopia and dystopia are often not the same across cultures and societies and that the ideation of "perfect society" is itself a cultural artifact. However, in post-World War II (WWII) America, there was a relative resurgence in dystopias and a decline in utopias, reflecting the general mood of society at the time.[34] Disch writes that "science fiction writers have generally steered clear of writing out and out utopias from a

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[32] Ibid., 3.

[33] Guy Baeten, "Special Issue: The Dialectics of Utopia and Dystopia," *Human Geography*, vol. 84, no. 3/4 (2002): 147.

[34] Ibid., 145–48.

sense that they are likely to be preachy."[35] However, that does not mean that there are no utopias present in science fiction; in fact, most "roots of contemporary science fiction can be traced to [both] utopias and darker dystopias"[36] Science fiction offers a vision of the future, but with it are artifacts of the world as it existed when the fiction was written. Jutta Weldes in the book, *To Seek Out New Worlds: Science Fiction and World Politics,* says "as a genre, science fiction starts with the known and projects or expands some part of it into the unknown….more important, of course, science fiction tells us about the present."[37] The use of literature to instigate awareness and discourse is a useful feature of science fiction for military strategists.

Science fiction generates a unique type of cognition through the use of estrangement. Estrangement allows the reader to analyze the scenario presented and make determinations about potential ways forward or outcomes. One does not have to follow the prescriptions of a science fiction scenario precisely to conduct a relevant analytic investigation of future military or policy alternatives. While science fiction allows military strategists and policymakers to contemplate the future, it is also, as Disch says, "in its nature, an ephemeral literature."[38] The ephemeral nature of science fiction means that while science fiction helps the reader explore and analyze the future under a myriad of technological trends or socio-political lenses, it is less likely (though not unheard of) for a science fiction novels' predictions stand up against time. Therefore, the analysis of science fiction stories must also account for the social and political milieu of the time. One reason for this is that in most hard science fiction, the science is mostly real, or close to being real.

In addition to hard science fiction being closer to technical reality, there is also a component of legitimacy and respectability necessary in order for science fiction to be used in a serious political or cultural discussion. Isaac Asimov, one of the preeminent science fiction writers of the 20th century, acknowledged in an interview later in his life

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[35] Disch, *The Dreams Our Stuff Is Made Of*, 104–5.
[36] Mark Hamilton, "Poli Sci-Fi 101: Lessons from Science Fiction Television for Global and Outer Space Politics," in *Securing Outer Space*, (London and New York: Taylor & Francis, 2009), 205. Quoting Jutta Weldes, *To Seek Out New Worlds: Science Fiction and World Politics*, Palgrave Macmillan US, 2003.
[37] Ibid.
[38] Disch, *The Dreams Our Stuff Is Made Of*, 110.

that "the dropping of the atomic bomb in 1945 made science fiction respectable."[39] David Seed, in his book, *American Science Fiction and the Cold War,* argues that a potential reason for the rekindled acceptability of science fiction was the use of atomic weapons in WWII. James Gunn, a professor at the University of Kansas and the lead of the university's Center for Science Fiction Studies, also agrees that the dropping of the atomic bomb in WWII changed the legitimacy and respectability of science fiction. Gunn notes that "from that moment on thoughtful men and women recognized we were living in a world of science fiction."[40] The analysis of potential future use of these massively destructive weapons necessitates a speculative rather than a practical study of their potential societal and political impacts.[41] Science fiction used legitimate technical approximations of nuclear technology to help policymakers and society consider potential futures, in a way traditional sociological and strategic speculation, could not.[42]

The resurgence in acceptance of science fiction in the US did not arise solely from the atomic bomb, but also from the shifting culture moving from WWII to a Cold War mindset. Importantly for strategists, another critical element of science fiction is its ability to paint realistic images of the social and cultural concerns. While the locale and technology in science fiction are generally futuristic, the social and political environments are often not pure imagination but borrow from history. In this sense, science fiction evokes a sense of familiarity even in an unknown and uncertain environment.[43] In science fiction, American ideals and visions of themselves are projected onto a future environment with imagined technology and a variety of political architectures. Visions of the future in science fiction provide strategists the opportunity to investigate the interaction of new technology and culture in some ways, but they can also limit the development of a military strategy of the present. The confinement of military strategy occurs because political perceptions of the environment, public fear or constraint, and historical conceptions of self may limit the imagination, even of science fiction writers, to contemporary thought. This occurs not because science fiction writers

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[39] David Seed, *American Science Fiction and the Cold War: Literature and Film* (Edinburg, Scotland: Edinburgh Press, 1999), 5.
[40] Ibid., 8.
[41] Ibid., 4.
[42] Ibid., 4.
[43] McCurdy, *Space and the American Imagination*, 5.

are not imaginative, but for fiction to gain popularity, it often must include some element of truth or familiarity to the reader. Since the locale and technology are often futuristic, many of the political and cultural elements are either similar to or in juxtaposition with the current social and political climate.[44]

Science fiction has guided American thinking about the exploration and military use of space. It does this by identifying the common elements and terms of reference that help create a shared cultural understanding of the space environment. In this way, science fiction has constructed our social and cultural perceptions space and the strategies which we should pursue to leverage that environment. For space travel, the newness of the domain meant that the narrative and lexicon generated by science fiction was shared not only by the readers of science fiction but by the broader American populous to include policymakers. Peter Burke describes the phenomena of the integration of culture and politics in his book, *What is Cultural History?,* explaining "that when new technical terms come into use, this is usually a sign of a shift in interests or approaches."[45] Science fiction often enmeshes political and cultural dynamics, and its use of the new domain of space provides a lexicon which permeates both communities. Stephen Dyson, in his analysis of Chinese science fiction in relation to international relations, writes, "science fiction is a cognitive genre, exploring changes in social relations based upon rational human responses to altered circumstances."[46] While science fiction was a method of social critique prior to the atomic bomb, after the bomb its social influence experienced a resurgence. In this way, its ideas and themes permeated the American lexicon and thought, increasing its reputability.[47] The social discourse led by science fiction, in turn, leads to political discourse. The interacting narratives of the social and political spheres entrenched the language and ideas of science fiction into a respectable dialogue and considerations regarding space travel.

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[44] The author may write about the antithesis of the current social or political climate, but it is still present so that readers feel a connection with the material.

[45] Burke, *What Is Cultural History?* 108.

[46] Stephan Benedict Dyson, "Images of International Politics in Chinese Science Fiction: Liu Cixin's Three-Body Problem," *New Political Science,* vol. 41, no. 3 (2019): 459–75, 463.

[47] Seed, *American Science Fiction and the Cold War*, 9. quoting Davenport, Basil, *The Science Fiction Novel: Imagination and Social Criticism,* Chicago: Advent, 1964, 102.

It is no coincidence that the reinvigoration of science fiction dealing with Mars and interplanetary travel has ballooned around the same time that Jeff Bezos and Elon Musk are trying to pursue similar goals. As acolytes of science fiction, these two men understand the role science fiction plays in generating a social and political dialogue about the future of interplanetary travel. Science fiction is a medium to present conflict and other circumstances where society, and ultimately the government, may have to make decisions regarding regulations, morality, and laws with regards to never before seen scenarios. Science fiction encourages participation and thoughtfulness and it helps entrepreneurs, policymakers, and general society communicate using standard terms under a commonly understood framework.

Previous Literature

It is clear that science fiction has influenced the new players in the space industry, but previous studies have also shown how science fiction and other imaginative exploits have influenced space policy more broadly. Howard McCurdy's book, *Space and the American Imagination* is a relatively comprehensive analysis investigating cultural influences on space, including science fiction. The book examines explicitly how space exploration went from imagination to reality.[48] McCurdy primarily focuses on how "space exploration tests the connection between culture and technology." He contends that the vision of space exploration, achieving as much dominance as it has, is mainly due to "its ability to attach itself to other cultural traditions that define the human experience."[49] McCurdy believes that not only is American culture central to space, but that space itself is now central to the American identity.[50] One of the central arguments in *Space and the American Imagination* is that science fiction played an important role in creating the cultural framework that inspired national space endeavors. McCurdy's treatment of the topic primarily focuses on the national space program as a whole, notably NASA and the Moon missions, and pays little attention to the development of military space. While this certainly is an integral part of the narrative, this paper seeks to expand the discussion to military policy development.

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[48] McCurdy, *Space and the American Imagination*, 2.
[49] Ibid., 5.
[50] Ibid., 324.

McCurdy argues that space exploration, as depicted in science fiction, served as a way to explore and understand, and also analyzed the linkages between technology and culture in a way other popular culture has not. To this end, he highlights the use of science fiction as analogy. For example, of the frontier analogy, he writes, "America is a frontier nation, and the vision of space as the final frontier beckons to American identity."[51] Additionally, he also briefly investigates the third motif discussed in this thesis: the idea of "man" as the hero, and the commitment in the early days of space exploration, that humans, not machines would lead the nation into space.[52]

Analogies are not only a helpful lens in analyzing science fiction, they are also foundational cognitive devises used in policymaking. Yuen Foong Khong, in his book *Analogies at War*, illustrates that analogies are used not just in political rhetoric, as he shows in the Vietnam War, but also guides decision making and policy more broadly. In this sense, analogies both restrain as well as promote political ideas and approaches. An example of an analogy restraining political action, according to Khong, is the idea of "not another Munich" or the more contemporary "not another Vietnam."[53] These restraining analogies help politicians illuminate the boundaries of their political guidance. Ernest May, writing in, *"Lessons" of the Past: The Use and Misuse of History in American Foreign Policy,* says that "policymakers use analogies to analyze or make sense of their foreign policy dilemmas."[54] In the early days of spaceflight, historical analogies did not exist and were therefore unable to provide an avenue for policymakers to assess or analyze their alternatives. I argue that because of the lack of historical precedence, science fiction served as a crucial source of analogical insight, providing, in some instances, analogies of the future. These future analogies were based on historical social, cultural, and political environments shrouded in an unfamiliar environment (space) and with potential future technology. Science fiction scenarios allowed policymakers to analyze alternative policy prescriptions and communicate those prescriptions using

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[51] McCurdy, *Space and the American* Imagination, 155.
[52] Ibid., 236.
[53] Yuen Khong, *Analogies at War: Korea, Munich, Dien Bien Phu, and the Vietnam Decisions of 1965* (Princeton, NJ: Princeton University Press, 1992), 6.
[54] Ibid., 7–8. summarizing Ernest May*, "Lessons" of the Past.*

commonly understood language with which the scientists, engineers, strategists, and tacticians were most familiar.

Thomas Disch, in *The Dreams Our Stuff Is Made Of: How Science Fiction Conquered the World* discusses how science fiction has permeated both American and international society. He states that, "in short, science fiction has come to permeate our culture in ways both trivial and/or profound, obvious and/or insidious. And its effects have not been limited to the sphere of culture..."[55] In addition to Disch, the books *The Social Construction of Technological Systems*, edited by Wibe Bijaker, Thomas Hughes, and Trevor Pinch and *Does Technology Drive History? The Dilemma of Technological Determinism,* edited by Merritt Roe Smith and Leo Marx, were useful in parsing out the different arguments of both social and technological determinism. Ultimately, this thesis takes a blended approach arguing that neither culture nor technology in itself is entirely deterministic and that the cultural imaginings of future technology in science fiction let us as Americans attempt to create what we want to be true, both societally and technologically.

Finally, I.F Clarke's 1966 book *Voices Prophesying War: 1763-1984* examines the role of imaginative future war literature through several different time periods. Clarke's book illuminates the role of speculative fiction in society and politics, and helps to show that future war literature has been an instrument of policy influence since at least the late 1700s, if not earlier. The book specifically focuses on the intersection of speculative fiction and military policy, providing useful insight for this paper.

This brief review of previous research shows that scholarship specifically focusing on science fiction and its role in space is somewhat limited, though gaining in popularity. Most previous studies center on the Apollo program and the civilian sector of government-sponsored space activities. Regarding "conventional wisdom" as it applies to the topic, there is a dearth of literature, and therefore consensus. What is identifiable is that the future of commercial space, and therefore the national strategic landscape, is driven by entrepreneurs who are trying to make the science fiction of their childhood a reality.[56] This paper seeks to explore the role science fiction appears to have played in the

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[55] Disch, *The Dreams Our Stuff Is Made Of*, 11.
[56] Davenport, *The Space Barons*, 251–52.

US military space program, and investigate its intertwined role in the early development of the total national space program and its policies. As such, this is simply the beginning of an investigation into the role that culture plays in generating military policy and how military strategists can leverage tools like science fiction to create a better strategy and, therefore, better policy than without the use of the genre.

Methodology

This paper conducts a historical analysis of US space policy, both written and de facto, as it relates to the cultural and political influence of science fiction. It includes a historical look at how the cultural artifacts of science fiction impacted early American military space policy. It also considers the long-term implications of science fiction and how the genre may impact in the near future military space policy, both written and inferred through development programs and missions of the US military space, in the present. The artifacts investigated broadly include the key motifs of science fiction and how they might have served as analogies or themes for scientists, engineers, and policymakers.

Additionally, this paper also considers the language used for the narratives surrounding the military (and civilian) space mission as influenced by science fiction. I argue that science fiction helped to construct the lexicon, that is, the common terms and language surrounding how Americans, including the policymakers for military space programs, discuss space. There is some risk in a historical and cultural analysis as we are still less than a century away from the genesis of the US military space program and arguably closer still, in policy terms, to the original space policy prescriptions. Due to the proximity of these events, it is possible that the full image of the development of the military space enterprise is not yet evident.

To scope the discussion, this thesis will focus on the development of the military space program beginning shortly after WWII in 1947 through the signing of the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, colloquially known as the Outer Space Treaty (OST), in 1967. At times, the military and civilian history intertwines because, during the period investigated, aspects of the military and civilian space program were interconnected. The thesis investigates three significant themes present in the early

development of the military space program. First, the paper investigates how the image and idea of the "final frontier" was translated into a space policy goal of expansion and military dominance. Second, the paper investigates the idea of "space for peaceful purposes," contrasting that idea with the co-development of atomic weaponry and the fear of a nuclear apocalypse. Third, this paper examines the idea of "manned," or in today's terms, "crewed," military space missions, and how that concept, influenced by the idea of the human as the central figure in space operations. Though the paper is focused on the American form of the science fiction genre and its influence on American culture, not all of the authors are American. This is not to say that science fiction has not, or does not, have a significant influence on other cultures, but those are just not the focus of this study.

The historical inquiry investigates the use of science fiction as an analogy in two cases and as a theme in the third, to create the initial military space program and policy for the US. To this end, I argue that science fiction often serves as a motif, either through an analogy or theme, as it conjures commonly understood ideas and allows policymakers to translate the boundaries of the type of policy they prefer. The first two motifs investigated, comprising the space frontier and the space-instigated nuclear apocalypse I consider future analogies, and the final motif of humans or man in space, I investigate is simply a theme. I use Yuen Foon Khong's framework in his book, *Analogies at War*, to help assess whether these analogies and themes were used as policymaking tools. Khong's Analogical Explanation (AE) Framework illustrates the various ways in which policymakers leverage analogies as cognitive aids: "Analogies 1) help define the nature of the situation confronting the policymaker, 2) help assess the stakes, 3) provide prescriptions. They help evaluate alternative information by 1) predicting their chances of success, 2) evaluating their moral rightness, and 3) warning about the dangers associated with other options."[57] Throughout this thesis, using the AE framework, I will identify when future analogies or themes from science fiction appear to have influenced the development of space policy.

Since much of the early American space policy was sparse, or minimal in its written form, this work utilizes sources of both written policy and doctrine, but also leans

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[57] Khong, *Analogies at War*, 10.

on inferred military policy. Policy inferences are made primarily by analyzing the space programs that the military investigated, invested in, and developed, as well as its rhetoric about those programs. Walter McDougall's…*The Heavens and The Earth: A Political History of the Space Age,* along with David Spires', *Beyond Horizons: A Half-Century of Air Force Space Leadership,* are both used extensively to outline the space programs in development during the initial days of military space development. McDougall provides insight into the early military (and civilian space program) against the backdrop of the Cold War and technocratic society. Spires looks more specifically at Air Force space programs and the leaders that helped develop those programs. Mark Erickson's *Into the Unknown Together: The DOD, NASA, and Early Spaceflight*, provides yet another historical understanding of American space history and is illustrative in showing the interconnectivity, and lack thereof, between the military and civilian sectors.

In addition to historical looks at military space program development, various Department of Defense (DOD) and Air Force doctrine documents, as well as military and political leader speeches or correspondence, are referenced. Of note, both Volume I and II of Frank Futrell's *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960 and 1961-1984*, helped clarify what the Air Force thought of as the fundamental ideas and concepts surrounding space at the time. Due to the unspecific nature of much of the military space doctrine and policies at the time, military policy in this paper is often inferred from the programs, program funding, or leadership support of a program when formal policy and strategy is lacking.

Roadmap

Chapter 2 explores the theory that science fiction served, in many cases, to assist policymakers in developing a conception of military space power, both through the positive and negative use of future analogies generated from science fiction. It also expands on the analogical use of science fiction, briefly discussed here, in more detail. Chapter 3 focuses on the early history of US military space policy using the analogical ideas of empire building, specifically in the "final frontier" present in a variety of science fiction stories. It contends that the initial US expansion into the space domain was an expression of the American drive for frontier dominance. This impetus leveraged a sense

of Pax Americana as a cognitive hook, solidifying the frontier analogy as a central feature of military space policy.[58] Chapter 4 discusses the evolution of space for peaceful purposes as an antiseptic for the nuclear dystopias presented in science fiction. The chapter begins with the history of the sentiment of space for peaceful purposes, at a time where rockets were primarily used for delivering death and destruction. Chapter 5 analyzes the idea of man as the central figure or 'hero' in spaceflight and the limitations that imposed when it came to the development of robotic and crewless semiautonomous, or autonomous military space vehicles. Chapter 6 summarizes the impact that science fiction analogies and themes may have had on the development of the military space program and provides implications for the future.

The hope for this paper is that it continues the limited discourse thus far of how science fiction can influence military policy and expands it into how science fiction *should or could* be used to influence that policy.

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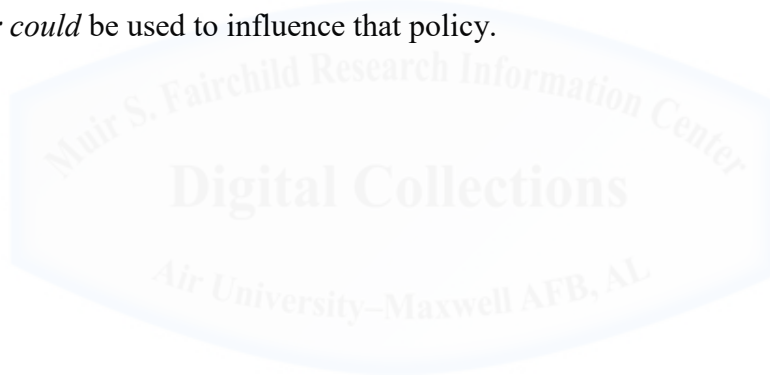
[58] Disch, *The Dreams Our Stuff Is Made Of*, 178.

Chapter 2

Science Fiction and its Levers of Influence

Here about the beach I wander'd, nourishing a youth sublime
With the fairy tales of science, and the long result of Time…

For I dipt into the future, far as human eye could see,
Saw the Vision of the world, and all the wonder that would be;

Saw the heavens fill with commerce, argosies of magic sails,
Pilots of the purple twilight dropping down with costly bales…

Till the war-drum throbb'd no longer, and the battle-flags were furled,
In the Parliament of man, the Federation of the world.

Alfred Tennyson, "Locksley Hall"

In preparation for war, the military must consider enemy actions under a given circumstances and then plan according to what they believe the enemy might do under a given context. Predicting enemy actions means military planners must also predict their own potential counteractions and even envisage future technological solutions to potential future military actions. This itself is a form of fiction, combining the methods of the realistic narrative to the practice of the military assessment, and the product is a full-scale story of imaginary warfare.[1]

Imaginary future war stories have existed for centuries one of those future war stories is *The Battle of Dorking,* written in 1871 by Sir George Tomkyns Chesney, a British Army general.[2] The tale was a popular imaginary war story that used fiction as a method to advocate against military complacency in the British Army.[3] Chesney's imaginary future war story shaped the growth of the genre of fictional future war literature for propaganda purposes. His tale, coinciding with the emergence of an increase in literacy, started a trend in European cities in the late 1800s of fiction writers, "appeal[ing] directly to the mass of the people in order to win support for the military or naval measures they advocated."[4] Both German and French authors leveraged imaginary

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[1] I.F. Clarke, *Voices Prophesying War: 1763-1984* (London: Oxford UP, 1966), 29.
[2] Ibid., 39.
[3] Ibid.,, 38.
[4] Ibid., 47.

war to advance their policy interests.[5] While the future war stories at the time did not have anything to do with space travel, they set a precedent for the use of fiction as a tool of propaganda and awareness, and in some cases, the rallying of policy.

The science fiction tales of the pulp era (1940s-1960s) attempted the same feat. Authors leveraged legitimate science in a way to advance the author's military and social policy interests into the public consciousness. The resulting public discourse influenced the scientists, engineers, and policymakers responsible for designing, creating, and funding America's future in space. Disch elucidates, "that such books were aimed not simply at producing royalties for their authors and publishers but at persuading the taxpaying public that their nation's survival depended on increased expenditure was clear from the number of admirals, generals, and politicians who turned their hands to the new genre."[6] *The Battle of Dorking* set the precedence for authors to use fiction as a means to guide social and political commentary. The robust dialogue generated by future war stories appears to be the most impactful in a time of rapid innovation and technological change, when the future does not appear to resemble the past or present. Science fiction authors of the pulp era merely reinvigorated the slumbering art form of fictional imaginary warfare as a tool of political and social influence. This chapter proposes a framework for how science fiction transforms and packages societal fears and technology in a way that is easily leveraged by policymakers.

Future Analogies

Khong defines historical analogy as, "an inference that if two or more events separated in time agree in one respect, then they may also agree in another."[7] This paper argues, much like Khong, that policymakers use analogies in the formulation of the military space enterprise, both written and inferred. However, the analogies used to develop space policy were unable to rely on historical space conflicts and therefore had to rely on fiction. Many science fiction stories of the pulp era focused on space, which corresponded with the emergence of military space policy and provided a fruitful avenue

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[5] Ibid., 48.

[6] Disch, *The Dreams Our Stuff Is Made Of*, 167.

[7] Yuen Khong, *Analogies at War: Korea, Munich, Dien Bien Phu, and the Vietnam Decisions of 1965* (Princeton, NJ: Princeton University Press, 1992), 6-7

from which to harvest analogies. In this paper, I call the use of science fiction stories or themes that entered popular discourse a *future analogy*. A future analogy is the use of science fiction as a tool to illustrate, compare, or clarify policy guidance or limitations that ultimately end up shaping national security approaches. Khong, in his analysis of historical analogies, claims that "historical analogies, once invoked, influence the actual selection of policy options."[8] Unfortunately, in Khong's research, policymakers often choose imperfect analogies for a given situation, leading them to make bad policy.[9] In the same regard, many politicians trying to determine what the military's future role in space may look like were limited to their imaginations and fictional or speculative literature about the subject of space, thereby also limiting the policy discourse.

Khong's Analogical Explanation (AE) Framework proposes that analogies help policymakers with cognitive "diagnostic tasks."[10] Khong uses the framework to analyze policymakers' use of analogies in six ways. The first test of the AE framework is whether the analogies "help define the nature of the situation confronting the policymaker."[11] Science fiction's future analogies help define the nature of the situation in two significant ways. First, science fiction provides a common lexicon so that policymakers can discuss space and potential future space technologies using commonly understood terms. Second, it provides a shared technological frame. This shared frame is an extension of the common lexicon in that a science fiction analogy provides a readily accessible, and purpose-built, cognitive framework around the use or potential use of a not-yet-engineered technology.[12]

Science fiction also appears useful in the second component of the AE framework, asking whether the analogy helps the policymaker assess the stakes of a given decision or policy choice.[13] The future analogies of science fiction are unique in that, unlike historical analogies, they provide several different perspectives from which

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[8] Ibid., 9

[9] Ibid., 9.

[10] Ibid.,,10.

[11] Ibid.,10.

[12] Wiebe E. Bijker, *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, MA: MIT Press, 2012). This book speaks to the concept of the shared technological frame.

[13] Khong, *Analogies at War*, 10.

policymakers can envision the potential stakes of a policy. Science fiction authors are able to be an "imaginative writer, free from the specialist preoccupations of the professional, [and] could allow his mind to move freely over the whole area of the possible."[14] The imaginative aspect of science fiction may enable decision makers to think broadly about the stakes of a given policy choice because it presents policy choices through various lenses, some that might seem contrived if not placed in the context of a fictional future. However, the ability for science fiction to help in assessment of the stakes is also limited in that it does not aid in a comprehensive or discrete analysis of alternatives, rather it provides general considerations of the potential implications of a given policy decision. Additionally, the inherent nature of science fiction means that policymakers can use social discourse to understand the cultural and societal stakes of their decision-making.

Khong's third AE framework analysis proposes that analogies "provide prescriptions" of future action. While future analogies certainly provide several alternate prescriptions for the future, they often do so in an allegorical, rather than direct, manner. Additionally, many of the prescriptions in science fiction for future technology are not currently available for military use. Science fiction's influence on this third factor of the AE framework is dubious because policymakers may interpret the allegories in many different ways. Therefore, the ability for future analogies to provide precise prescriptions for future action to the policymaker is present but marginal, and may in some cases create harmful unrealistic expectations.

The fourth, fifth, and sixth methods of evaluation prescribed by the AE framework "help evaluate alternative information in predicting their chances of success, evaluating their moral rightness, and warning about the dangers associated with other options."[15] Science fiction's ability to encourage emotional detachment, known as estrangement, regarding a given policy alternative may allow policymakers to use the analogy for a more profound assessment of the stakes than traditional historical analogies. The sense of estrangement from a given scenario or analogy allows fewer

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[14] Clarke, *Voices Prophesying War*, 90.
[15] Khong, *Analogies at War*, 10.

(although greater than zero) emotions or entrenched belief structures to influence the policymaker's analysis of various alternatives. In terms of the fourth criteria, "predicting their chances of success," future analogies do not provide as much surety about the success of an outcome as a historical analogy may appear to provide. In these cases, the use of future analogies may be a net positive in that historical analogies are often misused to promote an idea or method of action that may no longer be relevant to a given context.[16] Another advantage of future analogies is that they are not developed using a single storyline, but comprise an assortment of fictions centered on a single analogical theme.

The fifth factor in the AE framework assesses whether an analogy helps the policymaker "evaluate the moral rightness" of a given policy decision.[17] Science fiction excels in this factor of analysis. Due to its idealistic nature, there is a shared social and political discourse surrounding the ideas proposed in popular science fiction, purpose-built to help policymakers assess morality. In many ways, the popular social discourse of a time provides unique insight into the potential moral dilemma of a proposed policy. Additionally, the discourse surrounding science fictional ideas provides insight into the conceivable cultural reaction to issues with moral ambiguity. Most often, future analogies present a dichotomous choice between moral extremes, especially concerning the use of nuclear weapons in space, as discussed later in this paper.

Finally, future analogies, "warn about the dangers associated with other options."[18] As discussed in the previous two AE framework factors, science fiction presents a myriad of warnings with regards to different policy options. It helps policymakers imagine the world and war of the future under several different social and political constructs. In addition to being able to leverage insight about the dangers of other policy options in the social and political sense, it also provides an avenue to explore the dangers in a technological sense. By overlaying a diversity of possible technological inventions, future analogies allow decision-makers not only to parse different policy

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[16] Ibid., 9.
[17] Khong, *Analogies at War*, 10.
[18] Khong, *Analogies at War,* 10.

decisions, but also to consider how a variety of technology may impact, or be impacted by, those decisions in the future.

The future analogies generated by science fiction in the pulp era were skewed to cultural concerns of the time, playing on the fear of a nuclear dystopia or dreams of man-led exploration in a utopia where space is used primarily for peaceful purposes. Science fiction helps amplify and highlight certain features of an on-going political narrative, such as nuclear war or the quest for technological superiority.[19] In this way, the cultural relevance, especially of contemporary science fiction, has a compounding effect, making the analogies gleaned from science fiction novels appear cognitively consistent with the socio-political mindset of the day. While these future analogies are undoubtedly useful, they are also dangerous in that they are the imaginings of a future environment that are untested against reality. So, just as policymakers often use historical analogies badly, likewise they may also use future analogies poorly or inappropriately as well.[20]

This paper does not argue that science fiction formed the basis of all decisions surrounding American military space endeavors; it merely suggests policymakers drew from science fiction's motifs of future analogies and themes. The use of future analogies and themes shaped policy preferences, both positively and negatively, regardless of whether the policymaker in question was a science fiction fan or not. Often, the policymakers were not space enthusiasts and relied upon popular science fiction culture to guide the lexicon and shared technological frame. Additionally, policymakers relied on their subject matter experts, such as engineers and scientists, which frequently included science fiction fans, in order to shape military requirements and policy.[21]

Mechanisms of Influence

This section briefly explores the mechanisms by which science fiction motifs help shape policy. Social construction theory argues that the social dialogue is the more significant influencer of innovation and change. The counter argument, technological

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[19] Jones and Paris, "It's the End of the World and They Know It," 977.
[20] Khong, *Analogies at War,* 15.
[21] Alec Nevala-Lee, *Astounding: John W. Campbell, Isaac Asimov, Robert A. Heinlein, L. Ron Hubbard, and the Golden Age of Science Fiction*, (New York, NY: HarperCollins Publishers, 2019), 197.

determinism, contends that technology is the sole factor influencing the future. This paper contends that science fiction influenced space using cyclic interactions of the two theories, in an amalgam of influence Thomas Hughes, a University of Pennsylvania professor emeritus of history and a renowned historian of technology, calls "technological momentum."[22]

Social constructivism argues that social groups decide which problems, or aspects of those problems, are important.[23] In the process of problem definition, the groups also define and describe the technological artifacts that are of importance in problem-solving.[24] Social constructivists believe that societal and cultural dynamics produce technological innovation.[25] In this sense, science fiction helps identify and foster a shared sense of the problems for which policymakers might have to develop a technological solution. Additionally, science fiction helps provide a shared understanding of a problem set or artifact by proposing both the lexicon and narrative surrounding the space domain. Social constructivists, believing that human actors and activities drive innovation and technological change, are balanced by technological determinists, who believe technology, not society, drives change.[26]

Technological determinism is the "belief that in some fundamental sense, technological developments determine the course of human events."[27] Science fiction exacerbated the already prevalent mid-20th century notion of technological determinism, a mindset that seeks to attain prestige with the superior and futuristic technology promised by the space agenda and fueled with visions from science fiction. Clarke argues in his book that the impact of Chesney's *Battle of Dorking*, was in part due to the timing of its release and the optimistic public sentiment regarding technology in 1871.[28] At the

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[22] Thomas Hughes, "Technological Momentum," in *Does Technology Drive History?* (Cambridge, MA: MIT Press, 1994), 102.

[23] Bijker, *The Social Construction of Technological Systems*, 22–23.

[24] Ibid., 23.

[25] Henk J.H.W. Bodewitz, Henk Buurma, and Gerard H. de Vries, "Regulatory Science and the Social Management of Trust in Medicine," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, ed. Wiebe Bijker, Thomas Hughes, and Trevor Pinch (Cambridge, MA: MIT Press, 1987), 251.

[26] Bijker, *The Social Construction of Technological Systems*, xvii.

[27] Merritt Roe Smith and Leo Marx, *Does Technology Drive History? The Dilemma of Technological Determinism* (Cambridge, MA: MIT Press, 1994), 7.

[28] Clarke, *Voices Prophesying War*, 50.

time, the electric telegraph had "brought all the great cities of the world, within a single communication system" and there was a general feeling that the world was in a new era of technological advancement and transformation.[29] Clarke goes on to argue that "the period of 1870-1 represents a grand climacteric in international affairs and in the complex of the popular notions about progress and evolution that are behind the emergence of the tale of the future as a major literary device."[30] The pulp era of science fiction also promoted the idea of technology as progress at the same time as a new wave of popular interest in technology arose. During this era, technology was widely viewed as the cure to international power struggles with the Soviet Union in addition to a way to cure societal ills. The premise of many science fiction stories impressed upon the reader that America must attain technological advantages, such as military bases on the Moon or military control of low Earth orbit, before the Soviets, or risk national domination.

The social notions permeating the future war literature revolution in the 1870s are comparable to the same public sentiments that spurred the technocratic pursuits permeating mid-20th century America. Merritt Roe Smith explains the 19th and 20th-century science fiction phenomenon saying that, "technological utopian literature flourished in the late 19th and early in 20th centuries and made technological advance central to the perfection of society."[31] Technological determinism saw a remarkable resurgence following WWII and the dropping of the atomic bomb.[32] Technologies were seen as a method to achieve power as well as a symbol of human progress.[33] Behind both of these transformational periods, where futuristic fiction provided a pathway for future imaginations of war, was the idea of progress. "Werner von Braun observed that the exploration of outer space, like 'scientific progress' in general, was propelled by the need to envision the unknown: 'people are just curious… What follows in the wake of their discoveries is something for the next generation to worry about.' "[34] What binds technological determinism and social constructivism together is the allure of progress.

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[29] Ibid., 50.
[30] Ibid., 57.
[31] Smith and Marx, *Does Technology Drive History? The Dilemma of Technological Determinism*, 23.
[32] Ibid., 23.
[33] Ibid., 8.
[34] Michael L. Smith, "Recourse of Empire: Landscapes of Progress in Technological America," in *Does Technology Drive History?* (Cambridge, MA: MIT Press, 1994), 50.

Science fiction feeds into the idea of progress in that it is the idea of social and political "progress applied to the future of warfare."[35] Science fiction lets us create the future by imagining the social and technological underpinnings of various utopias and dystopias.

The reality that science fiction helped inspire is not solely socially constructed nor technologically determined, but a blended, reciprocal feedback loop combining the two mechanisms of influence. The dual interaction between social constructivism and technological determinism mostly aligns to Hughes's theory of technological momentum, which blends the two concepts.[36] Hughes's theory of technological momentum is "time-dependent" and asserts that, "social development shapes and is shaped by technology."[37] Hughes claims that technological momentum is "a more valuable interpretive concept than either technological determinism or social construction because it is time dependent yet sensitive to the messy complexities of society and culture."[38] Either culture or technology may impart initial inspiration for an innovation; it is then developed through both the forces of societal preferences and technological possibilities.
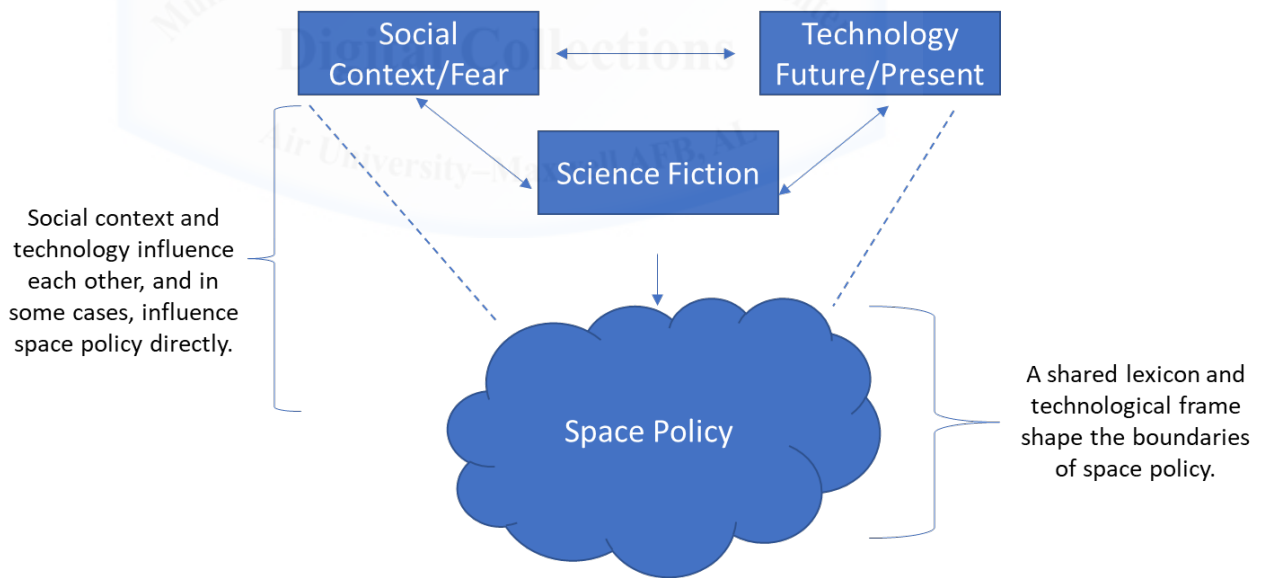

Figure 1. Science Fiction's Policy Influence (Source: Author original work)

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[35] Clarke, *Voices Prophesying War*, 85.
[36] Hughes, "Technological Momentum," 102.
[37] Ibid., 102–4.
[38] Ibid., 101.

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This paper argues that both the social and technological artifacts of science fiction influenced the resulting policy (and technology). However, this paper focuses primarily on the influence of social artifacts on policy through the device of science fiction, and covers the technological influence only in the sense that it influenced what policymakers believed to be the sphere of the possible, or the technological frame. The social components of those artifacts, the lexicon, and subsequent narratives surrounding science fiction, largely occur to the social components of technological momentum.

Science Fiction's Technological Frame

Hard science fiction is rooted in physics-based possibilities and thus creates possible future space technologies as objectives for policymaker planning. In the pulp era of science fiction, this included lunar colonies, orbital bombing platforms, and crewed rockets, to name a few. The technology proposed in some fictional stories also stoked prevalent societal fears about changes in technology causing a worldwide nuclear apocalypse or the loss of human agency to ever-increasing technology.

The generation of possible technological futures helped to frame the sphere of the possible for policymakers and society at large. In the unexplored domain of space, science fiction helped create a shared understanding of the words used to describe the domain and a shared understanding of the narrative, or the "shared technological frame."[39] This collective sense of the possible both proposes certain technologies as well as societal and policy choices related to those technologies. For example, the development of autonomous satellite operations was eschewed in early military space operations in part due to the fear of machines overtaking human agency. Similarly, military space policy advocated for military programs to explore and control the frontier of space, such as crewed space stations and lunar colonies.

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[39] Wiebe Bijker, "The Social Construction of Bakelite: Toward a Theory of Invention," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, Massachusetts: MIT Press, 1987), 164. In this section, Bijker claims that "a technological frame is composed of, to start with, to concepts and techniques employed by a community in its problem-solving.

Science Fiction's Lexicon and Narrative

The rising popularity of the science fiction genre in the mid-20th century provided a means for the public, scientists, engineers, and policymakers to converse concisely, applying a shared meaning to the terms used to describe activities or projects regarding the space domain. Henry Farrell, University of George Washington professor of political science and international affairs, asserts that "science fiction provides the basic intellectual vocabulary that we use to think about big issues that connect technology, society, and the environments we live in. As these issues become existential, science fiction is becoming increasingly important."[40] The dearth of meaningful discourse on the future of military operations in space before WWII amplified science fiction's impact on the lexicon of the space domain.

Science fiction is responsible for generating many of the words regarding space still in use today. "Spaceship," for instance, first appeared in an 1894 novel by J.J. Astor titled, *A Journey in Other Worlds*.[41] Following spaceship, spacemen, spacesuit, and even space cadet were all penned initially in science fiction.[42] In addition to words with 'space' in them, the term "blast off" was coined by E.E. Smith in his 1937 tale, *Galactic Patrol*. Karel Kapek invented the term robot, which was subsequently popularized by Isaac Asimov, one of the most famous science fiction writers of the pulp era. Asimov's stories, especially his three "laws of robotics," helped to generate a shared understanding of the entire scientific field of robotics.[43] And L. Sprague De Camp, a contemporary and friend of Asimov, is credited with the first use of the term "Extra Terrestrial" as a noun, though its first usage likely originates from H.G. Wells, in *The War of the Worlds*.[44] Most famously, Wells, in *The World Set Free*, penned the term atomic bomb. The above list illustrates the type of words developed by science fiction, but it is far from inclusive.

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[40] Henry Farrell, "Jeff Bezos' Space Plans Stir up Old Science Fiction," *Gulf News*, May 19, 2019, https://gulfnews.com/opinion/op-eds/jeff-bezos-space-plans-stir-up-old-science-fiction-1.63880572.

[41] Kathleen Harris, "10 Everyday Words We Got from Science Fiction Writers," *Whizz Past*, June 3, 2014, http://www.whizzpast.com/10-everyday-words-got-science-fiction-writers/.

[42] Jeff Prucher, "The Language of Science Fiction," Behind the Dictionary: Lexicographers Talk About Language, November 7, 2007, https://www.visualthesaurus.com/cm/dictionary/the-language-of-science-fiction/.

[43] Harris, "10 Everyday Words We Got from Science Fiction Writers."

[44] Max Cryer, *Common Phrases: And the Amazing Stories behind Them* (New York: Skyhorse Pub., 2010), 93.

There are so many other modern-day words that find their roots in science fiction that in 2007, the Oxford English Dictionary published a dictionary addendum specifically for science fiction.[45] The science-fiction-driven lexicon generates a shared meaning of the words that articulate activities in the space domain and creates a shared understanding of the type of technology and social structures the government ought to pursue. The shared understanding promotes a discourse that ultimately develops into a shared technological frame. The shared frame in turn serves as the basis for scientists, military planners, and policymakers to generate discussion and decisions.

The shared technological frame that science fiction engenders helps create the starting conditions or the "paradigm" for problem-solving.[46] This shared technological frame does not end with merely identifying the problem; it also includes "the strategies available for solving the problems and the requirements a solution has to meet."[47] Science fiction can influence the shared technological frame because it does not simply contain "arbitrary fantasy but rather [a] reworking [of] key metaphors and narratives already circulating in society."[48]

Cognition

The fact that space policy was influenced, in part, by science fiction is not entirely surprising. Humans require a way to create order out of uncertainty and analogies provide a cognitive foundation for the illusion of order. With a dearth of actual information on military space travel, the future analogies and themes provided by science fiction filled the gap and science fiction motifs were substituted instead. Historians and fictional authors alike acknowledge that metaphor and analogy are fundamental to human cognition and understanding and leverage those tools to improve their storytelling.

The storytelling method of science fiction produces an available and believable shared cognitive frame of reference for society and politicians. Science fiction can impart this influence on society and politicians because of naturally occurring cognitive biases.

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[45] Jeff Prucher, ed., *Brave New Words: The Oxford Dictionary of Science Fiction* (Oxford University Press, 2007).
[46] Bijker, "The Social Construction of Bakelite: Toward a Theory of Invention," 164.
[47] Ibid., 164.
[48] Seed, *American Science Fiction and the Cold War*, 2.

Cognitive biases do not discriminate and policymakers are not immune to the biases induced by science fiction. One human cognitive tendency is framing, which establishes a reference point to start thinking about a problem.[49] In addition to creating a frame, science fiction encourages its readers to fall prey to narrative fallacies. Narrative fallacies occur when "flawed stories of the past shape our view of the world and our expectations for the future."[50] Science fiction purposely pulls in perceived historical elements to create a sense of realism in the story's visions of the future. The lack of other available information on military space activities exacerbated the effect of science fiction narratives in the 1940s-1960s. Daniel Kahneman, in *Thinking Fast and Slow*, explains: "You cannot help dealing with the limited information you have as if it were all there is to know. You build the best possible story from the information available to you, and if it's a good story, you believe it."[51] Policymakers, in the absence of other competing narratives, latched onto the frames and narratives presented by science fiction to begin the crafting of military space policy.

In addition to the narrative crafting aspects of science fiction, knowing that the basis of a frame is fictional does not preclude susceptibility to cognitive biases. Jones and Paris explain that "the evidence increasingly suggests that people do not process fiction and nonfiction in fundamentally different ways."[52] Furthermore, contemporary research increasingly shows that both fictional and nonfictional sources of information are equally absorbed into a person's "real-world knowledge structures."[53] This cognitive absorption means that mental biases hold equal weight regardless of their inception as science fiction stories. However, science fiction stories do not just create a shared frame and narrative. Instead, they simultaneously generate tales just different enough from reality so that other emotional biases are marginalized, a phenomenon called estrangement.

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[49] Daniel Kahneman, *Thinking, Fast and Slow*, 1st ed (New York, N.Y.: Farrar, Straus and Giroux, 2011), 373–74.
[50] Ibid., 199.
[51] Ibid., 201.
[52] Calvert W. Jones and Celia Paris, "It's the End of the World and They Know It: How Dystopian Fiction Shapes Political Attitudes," *Perspectives on Politics*, vol. 16, no. 4 (2018): 970.
[53] Ibid., 970.

Estrangement leverages metaphors, such as aliens and robots, to represent an enemy or ourselves in a way that allows a reader to investigate an idea with little contextual or emotional bias.[54] However, good science fiction is careful not to over-extend the level of estrangement felt by the reader lest they lose interest in the story altogether.[55] For science fiction to influence policymakers, it must be interesting enough to seem pertinent, but estranged enough not to seem too true to life. It is in these optimal conditions that science fiction makes the greatest gains when applied to real-life scenarios. By providing objectivity, science fiction allows the reader to investigate a scenario from multiple angles, a useful feature for a strategist. Michael Adams writes in the *Pragmatics of Fiction,* that "such estranging features imply challenges to readers, challenges to epistemological awareness and agility, about open-mindedness and commonsense and imagination, about the capacity for wonder and the morality that accompanies contact with estranging world structure and world views."[56] Science fiction's narratives are unique in that they seem real enough so that they are cognitively believable, but imaginative enough so that policymakers can explore ideas with more cognitive flexibility than a historical analogy offers.

Ultimately, science fiction encouraged the building of an intellectual framework for the space domain by creating a narrative around an uncertain environment and showcasing various potential approaches. Science fiction authors understand the cognitive imprint their fiction creates. The *Space Merchants* authors Frederick Pohl and Cyril Kornbluth acknowledge their awareness and use of cognitive estrangement, blending real and fantasy into a single analogy.[57] They explain, "the best science fiction is that of the sort that extrapolated from known facts to imagine that a perfectly logical world of the future."[58] Notwithstanding its fictional roots, "narrative, be it in fiction or nonfiction, is fundamental to human cognition and persuasion," and the dearth of

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[54] Michael Adams, "The Pragmatics of Estrangement in Fantasy and Science Fiction," in *Pragmatics of Fiction*, ed. Miriam Locher and Andreas Jucker, (Walter de Gruyter, 2017), 329–30.
[55] Ibid., 330.
[56] Ibid., 332.
[57] Seed, *American Science Fiction and the Cold War*, 84.
[58] Ibid., 84.

nonfiction on the space domain enabled science fiction to be one of the leading narratives in both social and political dialogue.[59]

Application of Science Fiction Motifs

In some ways, science fiction motifs may be more insightful than historical analogies. Historical analogies are created by an understanding of the past; this past is often biased and blurred by emotional attachments and may not represent a real sense of what happened. It may be influenced by a historian's perspectives or by the participants, who may have skewed memories or limited perspectives. Nonetheless, for those with first-hand knowledge of an event, their perspective is taken as truth and becomes part of the historical legend surrounding an event from which analogies are formed. James Kiras contends, "contemporary accounts also suffered because participants often related the details of the conflict as they knew and understood them from their specific vantage point."[60] A future analogy or theme has less of this emotional blurring because of the sense of estrangement it provokes. While authors of science fiction undoubtedly have their own biases, they are free to write without the emotional lens that accompanies events experienced and remembered by the masses. Therefore, the analysis of a fictional event may provide a more in-depth analysis of military alternatives than a real incident, especially because a future analogy is unburdened by the perspectives and sentiment surrounding current views of an event.

Science fiction's creation of future analogies and themes provide the same cognitive impression of truth as a historical analogy because they both leverage representative ideas that feel cognitively familiar. They provide an easy way to conceptualize what the future military space program either should or should not resemble. Science fiction conceptualizations were, and remain, ingrained in the culture of the engineering and scientific communities. These entrenched understandings mean that scientists and engineers can guide technical discussions about space in a way even the layperson can understand using science fiction verbiage and storylines. Furthermore, the

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[59] Jones and Paris, "It's the End of the World and They Know It," 971.
[60] Kiras, James D. "Irregular warfare." *Understanding modern warfare* (Cambridge, UK: Cambridge UP, 2008): 265.

ingrained presence of science fiction amongst the scientist and engineering community also serves "a social instrument of information."[61] This shared culture and understanding was especially important for scientists and engineers because they bridged the gap between discourse and reality. The scientists and engineers generated the real capabilities that could be implemented by the political and military planners and strategists. However, in some cases, the frame and narrative presented by science fiction may have artificially bound early space policy.

The first narrative explored in this thesis centers around the analogy of space as a frontier. Frontier expansion is so deeply rooted in the American psyche that, when applied to space, it quickly and insidiously assumed a dominant role as the cognitive frame of choice, finding its way into speeches and military documents to this day. Even military programs that are seemingly Earth bound and not expansion focused, manage to retain a stranglehold on the foundational concept of the frontier. Early NASA Administrator, James Webb, specifically invoked the frontier analogy in a 1965 memorandum to a special assistant to President Lyndon Johnson writing, "Here the entire nation is developing technology which puts it as an organized entity, very much the same position as the pioneer was individually on the frontier."[62] The Space Age served as a re-articulation of the pioneer dreams of America's past. Presenting the appearance of the opportunity to, as Webb continued, "put us into a position where we are more in control the destiny of the world, and we have been since the early years after World War II."[63] The frontier analogy, built on the foundation of Frederick Jackson Turner's frontier thesis, is still frequently evoked in various contemporary policy documents, highlighting the strength of the analogy.

The second analogy investigated is that of a nuclear holocaust, the annihilation of nations or the world. David Seed, in his book, *American Science Fiction and the Cold War*, argues that science fiction may also form a sort of "negative prophecy where

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[61] Seed, *American Science Fiction and the Cold War*, 12. Quoting Albert Stone 1994.
[62] Walter A. McDougall, *The Heavens and the Earth: A Political History of the Space Age* (Baltimore: Basic Books, 1985), 388. Quoting a Memo from James Webb to Horace Busby (Special Assistant to the President), 23 March 1965, p3, LBJ Library.
[63] Ibid.

dreaded outcomes are envisaged and therefore hopefully deterred."[64] The promulgation of the nuclear apocalypse analogy contributed to social and political discourse about the future of nuclear weapons and their use from, through, and in space, before implementing policies. Clarke contends in *Voices Prophesying War* that "a forecast of coming disasters might be an even more forceful device for pushing through a desirable reform."[65] The bounding effects of the cognitive frame served a useful purpose in the 1960s leading to the creation of the OST, which banned weapons of mass destruction in space or on celestial bodies.[66] This analogy remains an ever-present cognitive crutch today, though the context of the international community of actors in space is significantly different.

The third motif analyzed is not an analogy but a theme of "man" as a necessary and central element of space domain exploration and exploitation.[67] Man, as the central hero in science fiction tales, created a human-centric frame in the minds of policymakers. The cognitive limit created by this particular theme was detrimental to military space policy development at the time. Scientists and engineers quickly realized that humans presented unnecessary engineering challenges to the development of space programs. However, top-level military officials and policymakers continued to pursue human-centric military space programs regardless of feasibility.[68] The main reason this theme does not persist is not that policymakers broke out of the cognitive frame willingly and came to their senses; it took a competing analogy and the realization that "manned" spaceflight was simply not an economically sustainable approach for the military. There is a significant cost difference in developing crewed assets for space-based tasks versus accomplishing those same tasks remotely.

The following chapters present looks at the historical context surrounding these three analogical themes and apply the AE framework to help analyze the role of science fiction on military space policy, both written and de facto.

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[64] Seed, *American Science Fiction and the Cold War,* 9.

[65] Clarke, *Voices Prophesying War*, 53.

[66] Bureau of Arms Control, Verification and Compliance, "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies," accessed August 28, 2018, https://www.state.gov/t/isn/5181.htm.

[67] Note that the use of 'man' throughout this paper is since, in the early days of space policy development, it was man, not humans as a whole, who were seen as the essential element.

[68] McCurdy, *Space and the American Imagination*, 238.

Chapter 3

The Frontier Analogy

It does not pay to be a prophet too specific.

L. Sprague De Camp

Frontier migration is foundational to the story of America.[1] After Columbus's 1492 expedition to the Western hemisphere, Europeans who were willing to pack up their lives and explore the unknown became the first pioneers and settlers of the American frontier. As these pioneers expanded westward, American independence, vitality, a spirit of adventure, and a restless search for progress followed them.[2] In 1890, the US Census Bureau "closed the frontier" by declaring the end of the "disappearance of the contiguous frontier line."[3] In a scholarly paper presented in 1893, historian Frederick Jackson Turner marked the closing of the frontier as a significant point in American history. He proclaimed that "now, four centuries from the discovery of America, at the end of a hundred years of life under the Constitution, the frontier has gone, and with its going has closed the first period of American history."[4] Turner argued that the social foundations based on expansion would drive Americans to continue their frontier expansion overseas.[5] American expansion overseas did not gain widespread adoption for many political, economic, and social reasons and subsequently, Turner's theory was largely disregarded in the early 1900s. America, however, had not relinquished its embedded idealism towards manifest destiny and the prospect of frontier expansion. The idea of the frontier may have entered hibernation in the political sphere, but the spirit of the frontier remained alive in science fiction.

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[1] Howard McCurdy, *Space and the American Imagination*, 2nd ed. (Baltimore, MD: Johns Hopkins UP, 2011), 155.

[2] "New Perspectives on the West: Frederick Jackson Turner," *Public Broadcasting Service*, accessed 1 February 2020, https://www.pbs.org/weta/thewest/people/s_z/turner.htm. Turner's thesis, "The Significance of the Frontier in American History," was presented as a lecture at the 1893 World Columbian Expedition fair in Chicago.

[3] Ibid.

[4] Ibid.

[5] Ibid. Turner's thesis is not universally accepted because of its elements of American exceptionalism which largely ignore the negative impacts of American frontier expansion on the indigenous people already present on the continent, and the lives of slaves sacrificed necessary to fulfill America's frontier dreams.

Arguably, no future analogy in American history is more ubiquitous than the idea that space represents the *new, high,* or *final frontier*. While H.G. Wells in his book, *The First Men in the Moon,* never explicitly uses the word "frontier," the protagonists' journey in the tale invokes the spirit of frontier adventure.[6] Though science fiction stories previously used the spirit of the frontier myth, the American lexicon did not refer to space as a frontier until Robert Heinlein, an acclaimed science fiction author of the pulp era. Heinlein's stories *Rocketship Galileo* and *Have Space Suit, Will Travel*, both endear the idea of space as an analogy of frontier expansion but do not name the frontier outright.[7] The term frontier was first directly used in conjunction with space in Heinlein's 1950 novel, *The Man Who Sold the Moon*. In it, Heinlein's billionaire protagonist, Mr. Harriman, is asked what it means to have launched the first mission to the Moon. He responds, "Tell them this means new frontiers, a shot in the arm for prosperity."[8] Shortly after Heinlein invokes the image of space as a frontier, the term begins appearing repeatedly in the popular and scientific lexicon. In 1952, Werner von Braun, along with four other authors, published a book of speculative science-based fiction meant to draw public awareness to the potential opportunities in space called *Across the Space Frontier*.[9] The book further crystallized the space frontier narrative in popular and political culture. Until the advent of *Star Trek* in the mid-1960s, space was primarily referred to as the "space frontier" or the "new frontier."[10] In the mid-1960s, the term "final frontier" becomes familiar, and shortly after, it is used interchangeably with the term "high frontier" which is also the title of Gerard O'Neill's famous 1976 work.

Gary Westfahl, in his study on the use of space frontier analogies throughout science fiction, echoes Turner's 1893 thesis about the importance of the frontier ethos to the American psyche. Westfahl writes, "If Earth no longer offered frontiers to inspire and

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[6] H.G. Wells, *The First Men in the Moon* (United Kingdom: Bowen-Merrill, 1901). The protagonists in Wells's tale are sent to the Moon to prospect it only to find that the Moon is already inhabited.

[7] John Rieder, "American Frontiers," in *The Cambridge Companion to American Science Fiction*, ed. Eric Carl Link and Gerry Canavan, (New York: Cambridge UP, 2015), 170.

[8] Robert A. Heinlein, *The Man Who Sold the Moon and Orphans of the Sky*, New Combined Edition (Riverside, NJ: Baen Publishing Enterprises, 2013), 171. After searching of the Proquest archive as well as running a variety of n-gram searches, there appear to be no scholarly or political references to space as a frontier before Heinlein's work. Starting in the mid-1950s, after Heinlein's book, there is a significant increase in the use of the term.

[9] Joseph Kaplan et al., *Across the Space Frontier* (New York, NY: Viking Press, 1952).

[10] This was analyzed using Google's n-gram tool and filtering for trends using Proquest's advanced viewer.

strengthen Americans, space might provide those frontiers."[11] The frontier analogy acquired such a stronghold on the American psyche because it played on their already ingrained beliefs about themselves. In 1893, Turner proposed in his thesis that the concept of frontier expansion is fundamental to the American way of life.[12] Americans of the 1950s and 1960s embraced the idea of expansion and the spread of democracy because the frontier was one way to ensure democracy reigned supreme over the tyranny of communism. Turner's ideas about the centrality of the frontier "inspired an outpouring of books on what became known as the idea of American exceptionalism."[13] After 1890, Americans may have felt that their frontier days were over. However, leveraging the significance of the frontier to the American psyche, science fiction writers like Heinlein adopted the concept to provide Americans hope for a new potential frontier: space.

This chapter examines the frontier analogy including its meaning and its various uses in American society. Then, I assess the analogy's impact on policymakers, both civilian and military. I highlight some of the military programs developed out of the frontier analogy policies. Finally, I place the analogy within the AE framework, finding that the frontier analogy helps policymakers to define the nature and stakes of the space environment as well as to provide prescriptions for policy. The frontier analogy coupled with the milieu of the 1950s and 1960s sets up a false dichotomy between exploring the space frontier and communist hegemony.

Social Influence and Perspectives

Most nations have stories they tell about how their country developed; this is their creation myth.[14] In America, the idea of frontier expansion is central to the creation and development of the nation. It is linked indelibly to the formation of the national identify and the stories Americans tell about its establishment. Through these stories, Americans subconsciously link adventurism and expansion to the very core of what being an

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[11] Gary Westfahl, ed., *Space and Beyond: The Frontier Theme in Science Fiction* (Westport, CT: Greenwood Press, 2000), 2.

[12] Peter Hays, "Space and the Military," in *Space and Defense Policy: Space Power and Politics*, ed. Damon Coletta and Frances Pilch (Abingdon, OX, UK: Routledge, 2013), 153.

[13] McCurdy, *Space and the American Imagination*, 161.

[14] McCurdy, *Space and the American Imagination*, 155.

American entails. To be sure, the frontier analogy, like most creation myths, is mostly a utopian retelling of history, but that does not diminish its influence throughout society.

Despite the eagerness to adopt such ideas in science fiction circles, as the future analogy of the space frontier emerged in popular culture, Americans did not accept the idea wholesale. Within academia, there was a movement among historians to discredit the notion of American frontierism, arguing that space was unlike the previous frontier and that the public was misconstruing and misusing the analogy.[15] McCurdy writes "the vision of space as the final frontier is controversial… [but] advocates of the frontier analogy visualized lunar bases with hundreds of people and space colonies attracting millions."[16] The logical argument presented by historians had little impact because, at its core, Americans were drawn to the idea of space as a frontier. After all, the imagery was familiar, comfortable, and uniquely tied to an American sense of prestige. The space frontier of the future presented an opportunity for America to fulfill its expansionist manifest destiny tendencies without the displacement of indigenous people.

The 1950 science fiction film, *Destination Moon,* served to legitimize and popularize the ideas proposed by Heinlein. The movie, based on his 1947 work, *Rocket Ship Galileo*, used sound engineering and scientific principles to show how industry could set up a lunar base and control access to that base and the Moon.[17] In some cases, the critical reception of *Destination Moon* was because it was too realistic and did not have the same light-hearted fictional tropes as "softer" science fiction tales such as *Buck Rogers*.[18] *Buck Rogers*, along with *Flash Gordon*, was a popular soft science fiction comic that appeared in daily newspapers at the time, and was influential on American vernacular regarding space. While few took the adventures of Buck Rogers as serious pursuits from which to build policy, it was frequently referenced to describe what was too outlandish of a mission to pursue. However, the genuine science and engineering the movie portrayed served an essential purpose: it relayed the real challenges of reaching the Moon and fielding a lunar colony or base. The physics-based depictions of *Destination Moon*

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[15] McCurdy, *Space and the American Imagination*, 161.
[16] Ibid., 155.
[17] Sidney Perkowitz, *Hollywood Science: Movies, Science, and the End of the World* (New York: Columbia UP, 2010), 219.
[18] Ibid., 219.

provided policymakers with a shared technological frame from which to start program and policy discussions. Another reason that Heinlein's work carried more popularity and acclaim than other authors of the era was due to his 1940 tale "Solution Unsatisfactory," which uncannily predicted the US's creation and use of nuclear weapons causing "radioactive dust." Heinlein's work was so prophetic that his writings garnered additional gravitas when US nuclear efforts were revealed to the American population at the end of WWII.[19]

The image of space as a frontier also appealed to the war-weary masses of the post-WWII era. Many Americans were looking for hope and a new, prosperous adventure. The frontier was an opportunity to explore a place where the "indignities of ordinary life [one where] onerous no-future jobs and low status are to be remedied, as they were in an earlier expansion into the American West."[20] Disch explains that many Americans took the frontier analogy literally, believing that "space is like Texas, only larger."[21] The Texas comparison certainly appealed to one policymaker of note, Lyndon Johnson, who became a recurring advocate for American expansion in space, saying "The future of this country and the welfare of the free world depends on success in space."[22] Though the space frontier was not called as such until Heinlein's 1950 tale, the idea of expansion outside of our planet started appearing in fictional stories in 1865 with Jules Verne's tale *From Earth to the Moon*.[23] Disch clarifies the early fascination with the Moon specifically, saying that it "is the nearest destination in outer space and, unlike the planets, it looks like a somewhere."[24]

Two years after Heinlein's reference to space as a new frontier in *The Man Who Sold the Moon*, von Braun's *Across the Space Frontier* was published. The book describes visions of the future in the space frontier including multi-stage rockets, a

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[19] Seed, *American Science Fiction and the Cold War*, 31.

[20] Disch, *The Dreams Our Stuff Is Made Of*, 178.

[21] Ibid., 178.

[22] Merritt Roe Smith and Leo Marx, *Does Technology Drive History? The Dilemma of Technological Determinism* (Cambridge, MA: MIT Press, 1994), 264.

[23] Jules Verne, Lowell Bair, and Gregory Benford, *From the Earth to the Moon* (New York: Bantam Books, 1993).

[24] Disch, *The Dreams Our Stuff Is Made Of*, 60.

crewed space station, and lunar colonies.[25] The crewed space station in the book had both Earth-centric weather monitoring as well as worldwide communications capabilities run by a military or civilian crew.[26] The lunar colonies in the book have military fortifications with the colonies serving dual roles. First, they were staging grounds for further space frontier expansion. Second, the colonies were meant to help control both space and the Earth from the vantage point of the Moon as the *ultimate high ground*.[27] The advantage of the high ground included the capability for launching nuclear-tipped weapons. *Across the Space Frontier* proposes that the nuclear-tipped missiles may be "a deterrent which might cause a successful outlawing of war."[28] This speculative science fiction was followed by two other similar works in the series by the same authors. The science-based imaginary tales set a precedent for the way Americans think about space, but the most unique aspect of this trilogy of fictional futures stories is their authors.

The authors of *Across the Space Frontier* represent an influential cross-section of American society. Through this novel, the authors formed a collective vision of the future and a shared technological frame that would permeate through all facets of society, ultimately impacting policymakers up to the presidential level. The most recognizable author today is Werner von Braun, regarded by many as "the father of the US space program."[29] Von Braun specifically wrote science-based imaginary futures, in other words, science fiction, to encourage an interest in the exploration of space among the general public.[30] In 1953, shortly after writing *Across the Space Frontier,* von Braun and then-Senator John F. Kennedy met during a television promotion where Kennedy reportedly told von Braun that he had been following his work on missile development.[31] Von Braun, in his professional duties, consistently advocated for the development of a satellite and other space exploration technology. Unfortunately, in the pre-*Sputnik* era, he was relegated solely to developing rocket technology and his dreams of space exploration

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[25] Jim Plaxo, "Book Review: Across the Space Frontier," *National Space Society*, 1 May 2007; Kaplan et al., *Across the Space Frontier*.
[26] Plaxo, "Book Review: Across the Space Frontier"; Kaplan et al., *Across the Space Frontier*.
[27] Kaplan et al., *Across the Space Frontier*, 53.
[28] Ibid., 56.
[29] Plaxo, "Book Review: Across the Space Frontier."
[30] McCurdy, *Space and the American Imagination*, 27.
[31] Douglas Brinkley, *American Moonshot: John F. Kennedy and the Great Space Race* (New York, NY: Harper, 2019), 125–27.

were merely a side project. In 1957, just before the launch of *Sputnik*, General John Medaris, head of the Army Ballistic Missile Agency, publicly admonished von Braun for working on a satellite. Medaris "reminded von Braun that he had authorized no work on a fourth stage to the missile," a fourth stage that ultimately became the Explorer I satellite.[32] However, in secret, Medaris allowed von Braun to continue his side project, but "he cautioned Dr. von Braun that there must be no public claims or discussion by employees of this agency which would falsely give the impression that we are in the satellite business."[33] Two days after the Sputnik launch, von Braun's team was finally authorized to begin an investigation into satellite development. However, they were still relegated to the back-up plan with regards to satellites.[34] Von Braun was not allowed to focus his work on systems that would fulfill his frontier ambitions outlined in *Across the Space Frontier* until Kennedy's 1961 speech refocused American national aspirations on the Moon.

The far-reaching influence of the ideas and technological frame proposed in *Across the Space Frontier* did not end with von Braun. Heinz Haber, who would go on to co-host the Disney movie *Man in Space* with von Braun, is probably the least well known of the authors. Haber, was a German scientist brought to the US during Operation Paperclip, a US mission to bring Nazi scientists to America at the end of WWII. Haber helped to invent the field of aerospace medicine, specifically outlining concerns that humans might encounter during space travel.[35] Haber also continued to pair with Disney, promoting space and nuclear fission in the film, *Our Friend the Atom*, and as a consultant on the iconic Tomorrowland in Disneyland.[36] The other less well-known author is William Ley. Ley was a prominent science fiction author in the pulp-era though he is less

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[32] Yanek Mieczkowski, *Eisenhower's Sputnik Moment: The Race for Space and World Prestige* (Ithaca, NY: Cornell UP, 2013), 127.

[33] Ibid., 127.

[34] Ibid., 127–28.

[35] Linda Ezell and Edward Ezell, "SP-4209 The Partnership: A History of the Apollo-Soyuz Test Project," The NASA History Series (National Aeronautics and Space Administration, 1978), chap. 3, https://www.hq.nasa.gov/office/pao/History/SP-4209/ch3-1.htm; Annie Jacobsen, *Operation Paperclip: The Secret Intelligence Program to Bring Nazi Scientists to America*, (Boston, MA: Little, Brown Publishing, 2014), http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=764508.

[36] Maria Popova, "Our Friend the Atom: Disney's 1956 Illustrated Propaganda for Nuclear Energy," *Brain Pickings*, 2013, https://www.brainpickings.org/2013/02/18/our-friend-the-atom-disney/.

well known today. It was likely his literary skills that made *Across the Space Frontier* appeal to science fiction fans and the general populous alike.

The other three authors, though only known in the scientific and political communities, had a tremendous impact on military space policy. Oscar Schacter, who wrote fictional tales of space in his spare time, was a renowned lawyer and diplomat who "helped frame the underpinnings of the United Nations."[37] Just a year after publishing *Across the Space Frontier,* he became a legal assistant to the Secretary of the UN and director of the UN's general legal division.[38] While his job on the UN legal council had no direct ties to space, he did have a direct influence on both domestic and international policymakers when it came to his ideas about space. The second politically connected author of the book was Joe Kaplan. Kaplan's real job was as a physicist at the University of California, Berkley, where he served as the director of the institution's Geophysics Department.[39] Most importantly, a year after publishing the book, he became the chair of the United States National Committee for the International Geophysical Year, serving from 1953-1963, a period in which the Soviet Union, and subsequently the US, would launch the first artificial satellites.[40] In this role, Kaplan's views of space as a new frontier came in direct contact with international, national, and military policymakers. The last author of *Across the Space Frontier,* Fred Whipple, arguably had the most impact on national and military space policy, mainly due to the timing of *Sputnik.* Whipple, as evident in *Across the Frontier*, could imagine a day in the future where artificial satellites would circle the Earth. Luckily for the US, he did not settle on just imagining this future, he prepared for it as well. Whipple organized a worldwide coalition of amateur observers capable of tracking, "these then hypothetical objects and determine[ing] their orbits."[41] When *Sputnik* launched in 1957, Whipple's team of astronomers were the only ones capable of tracking and doing orbit determination for the

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[37] Wolfgang Saxon, "Oscar Schachter, 88, Law Professor and U.N. Aide," *New York Times*, December 17, 2013, https://www.nytimes.com/2003/12/17/nyregion/oscar-schachter-88-law-professor-and-un-aide.html.
[38] Ibid.
[39] "Sputnik Biographies: Dr. Joeseph Kaplan," NASA History Division (Washington D.C.: National Aeronautics and Space Administration, n.d.), https://history.nasa.gov/sputnik/kaplan.html.
[40] Ibid.
[41] "Dr. Fred Lawrence Whipple," *Smithsonian AstroPhysical Observatory*, accessed February 8, 2020, https://www.cfa.harvard.edu/about/flwhipple.html.

object.[42] Whipple's team quickly became a central facet of the American space race and expanded and improved satellite tracking philosophy and technology as the space race quickened.[43] Whipple's work was so influential that in 1963, President Kennedy personally awarded him the Distinguished Federal Civilian Service award.[44]

While *Across the Space Frontier* and other imaginary works of science fiction proposed the concept of a space frontier, *Sputnik* provided the catalyst for the US to actually develop policies regarding space. The launch of *Sputnik* brought a greater awareness of the potential reach of space to the US military, political community, and society at large because it challenged the nation's sense of geographic security.[45] McDougall says the security uncertainty was in part due to the dystopian science fiction tales and the fact that space was an unknown entity "that Americans had come to associate, thanks to Hollywood and science fiction, with sudden and irresistible horrors."[46] In other words, the immediate aftermath of *Sputnik*, combined with science fiction tales, initially created fear in the general population. However, the other more uplifting fictional tales of space as a frontier subsequently created a sense of opportunity and hope for the future. Future Vice President Lyndon Johnson watched *Sputnik* fly over his ranch in Texas.[47] He relayed that as the Soviet object soared over, he was overwhelmed with the feeling of his small piece of the American frontier being intruded on, saying: "In the Open West, you learn to live closely with the sky. It is a part of your life. But now, somehow, in some new way, the sky seemed almost alien. I also remember the profound shock of realizing that it might be possible for another nation to achieve technological superiority over this great country of ours."[48]

The launch of *Sputnik* tied satellite technology and space exploration to the Cold War. With the ongoing American reaction to *Sputnik*, the frontier analogy of science fiction fed into preexisting Cold War fears and rhetoric. Science fiction had already

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[42] Ibid.

[43] Ibid.

[44] Ibid.

[45] Walter McDougall, *The Heavens and the Earth: A Political History of the Space Age* (Baltimore, MD: John Hopkins UP, 1997), 142.

[46] Ibid., 142.

[47] Ibid., 141.

[48] Ibid., 141. Referencing quotes from Lyndon Baines Johnson, *The Vantage Point: Perspectives of the Presidency 1963-1969* (New York, 1971), 272.

promoted the lexicon and shared technological frame among scientists and engineers, one that had begun to percolate through senior policy levels of the US government. While science fiction gave Americans a way to talk about space, Sputnik tied the space frontier to the Cold War and thus the national importance of space exploration. If the Soviet Union controlled the space frontier, that meant the umbrella of communism would literally and metaphorically overshadow the globe. Sputnik generated the social and political urgency to create a policy in which the US was the dominant actor in the frontier of space.

Influence on Policymakers

The pervasive nature of the frontier analogy makes it appear as if it was always agreed upon in political circles. However, no such consensus on the analogy existed at first. As president, Dwight D. Eisenhower was particularly resistant to the idea of expanding outward into space in the manner of a frontier. When a Columbus-based historical analogy was proposed to Eisenhower, he did not find it compelling. The advocates who had proposed Americans expand their frontier by way of a lunar voyage were reportedly told by Eisenhower that "he was not about to hock his jewels" to support a lunar expedition.[49] Regardless of its veracity, the story transformed into "an emblem of his modest space effort."[50] Eisenhower's disinterest in exploring the space frontier is juxtaposed by Lyndon Johnson's voracious pursuit of the frontier, a political dichotomy that was likely purposeful. Eisenhower's marginal interest in space was something Democrats capitalized on in the post-*Sputnik* presidential race. Space served as a symbol for Kennedy and Johnson to use to their electoral advantage, rather than a genuine policy desire. Aside from pure politics, the influence of the frontier analogy on lower-level policymakers had an immediate and lasting effect. In March of 1958, even as special advisor Killian and Eisenhower were trying to disregard the idea of space as a frontier, the military and NASA wholeheartedly embraced the idea.

In March of 1958, *Air Force Magazine* published an entire special issue on space. A critical narrative throughout that issue was the idea of space as a frontier; one of the

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[49] McCurdy, *Space and the American Imagination*, 158. Repeating a quote in the San Diego Union, 22 September 1963 by Ira Eaker, "Columbus and the Moon: Debates on Voyages are Similar."
[50] Ibid., 158.

featured articles is titled "Man's Assault on the Space Frontier" with another titled simply, "The Space Frontier."[51] The National Aviation Education Council subsequently published the latter as an informational book on military space. The Air Force was not the only service championing the idea. The Deputy Commander of Redstone Arsenal, Army Brigadier General John Barclay, wrote a piece for *Ordinance* magazine about "how the development of satellites and guided missiles have opened up a 'space frontier.'"[52] Brigadier General Barclay goes on to implore the "science-military-industry team," saying they "must be willing to explore the possibilities [of the space frontier] for peace and national defense."[53]

While high-level military officials promoted the space frontier analogy, NASA, which was loath to agree with the military space community on most issues, similarly promoted the space frontier analogy. NASA's lunar pursuit was bolstered by the frontier analogy and the hope that, eventually, they would shepherd millions of US citizens to space colonies on the Moon and beyond.[54] NASA historian Linda Ezell explains, "Frontier beyond the atmosphere was the goal ... By mid-decade, the Navy, Army, and Air Force were all exploring different paths by which to reach that frontier."[55] McCurdy writes that space advocates often promote the idea of the frontier to encourage innovation, arguing that, "if the urge to explore is curtailed…civilization decays."[56]

A critical facet of opening the space frontier, as described in science fiction, is "establishment of bases on the Moon."[57] NASA championed the idea of a lunar base as the would-be leaders of a Moon exploration. However, NASA also encouraged the military to pursue lunar goals assuming that they would serve as a "space cavalry" once the Moon colonization efforts began in earnest, as long as NASA's budget was not impacted. The budding space industrial base, born out of the aeronautical industry, also

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[51] William Levitt, "Space Weapons: A Handbook of Military Astronautics," *Air Force Magazine*, March 1958. The magazine also has articles by Jimmy Doolittle and CSAF Thomas White championing space.
[52] *Missiles, Rockets, and Space in War and Peace*, 5th–6th ed., vol. 70 (Department of the Army, 1959), 9. The book summarizes John Barclay, "The New Dimension," *Ordinance Magazine,* vol. 43, no. 231 (Nov-Dec 1958), 392-395.
[53] *Missiles, Rockets, and Space in War and Peace*;. Barclay, "The New Dimension," 392-395.
[54] McCurdy, *Space and the American Imagination*, 155.
[55] Linda Ezell, *NASA Historical Data Book*, 1958th–1968th ed., vol. II, The NASA Historical Series (Washington D.C.: National Aeronautics and Space Administration, 1988), 91.
[56] McCurdy, *Space and the American Imagination*, 160.
[57] McCurdy, *Space and the American Imagination,* 160.

encouraged the space frontier analogy, publishing concept art with lunar bases complete with habitats, rovers, and military facilities.

The frontier analogy reached its zenith in the early 1960s, just over ten years after Heinlein's prescient words of "tell them this means new frontiers."[58] President Kennedy's 1960 speech to the Democratic nominating convention included a call for the US to take a leading role in space. Kennedy referred to space as part of "the new frontier," forever etching the science fiction-born analogy into the American consciousness.[59] Now colloquially known as his "The New Frontier" speech, Kennedy did not just speak of the frontier as solely in space, but also as a myriad of new challenges for the American people.[60] Kennedy used the historical analogy of the frontier to impress upon the American people that the frontier is not closed and that there are "new horizons to be explored" and new problems to be solved.[61] While Kennedy originally meant to utilize the frontier analogy as a holistic vision for the nation, the science fiction proposed analogy of space as the central feature of a new frontier was already prevalent in popular culture. Douglas Brinkley writes, "In early 1960 the term New Frontier was ubiquitous in space-related television and print stories…and Kennedy grabbed it as his own."[62] He evokes much of the same imagery as the science fiction of the pulp era, claiming that the "times require imagination, and courage, and perseverance," asking every American to be "pioneers toward that new frontier."[63] For Kennedy, the space frontier served as a useful rhetorical device on the campaign trail, "as a metaphor for [how] American technology [was] falling behind that of the Soviets," continually linking dominance of the space frontier with the Cold War.[64] Kennedy also invoked the frontier analogy to inspire other "uncharted areas of science and space…as unsolved problems of peace and war."[65] Though Kennedy does not limit the use of the frontier analogy to space, his connection of space to the frontier cemented the analogy of space in the minds, and lexicon, of military

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[58] Oliver Morton, *The Moon: A History for the Future* (New York: PublicAffairs, 2019), 173.

[59] John Kennedy, "Acceptance of Democratic Nomination for President" (Speech, Democratic National Convention, JFK Presidential Library, July 15, 1960), https://www.jfklibrary.org/learn/about-jfk/historic-speeches/acceptance-of-democratic-nomination-for-president.

[60] Ibid.

[61] Ibid.

[62] Brinkley, *American Moonshot*, 195.

[63] Kennedy, "Acceptance of Democratic Nomination for President."

[64] Brinkley, *American Moonshot*, 202.

[65] Kennedy, "Acceptance of Democratic Nomination for President."

policymakers. Kennedy portrayed the frontier as a lofty and morally necessary goal, especially for a country still reeling in the aftermath of being beaten into space by the Soviet Union.[66] Through this language, the influence of the frontier narrative created by science fiction had percolated fully through society and up to the highest domestic political office.

It was in Kennedy's 25 May 1961 "Address to Joint Session of Congress" where he proposed that the nation undertake a mission to the Moon, that the analogy of the new frontier of space was further solidified as a critical American idea.[67] While Kennedy never uses the word frontier in his Moon speech, his rhetoric evoked an image of adventure on the frontier. He famously called for Congress to fund a mission to the Moon, however, within his goal of frontier exploration and "the exciting adventure of space," Kennedy also couples the necessity of building "new and larger liquid and solid rocket engines," as well as communications satellites for "worldwide communications," a worldwide constellation of weather satellites, and a nuclear rocket to explore beyond the Moon and the solar system itself.[68] Kennedy's plan feels familiar because it is—the proposals were the building blocks to achieve the future imagined a decade earlier in *Across the Space Frontier* almost verbatim. The only substantive change from the fictional tale is that instead of in-space crews operating the communications and weather platforms, the systems would be autonomous. Although weather and communications satellites are Earth-centric missions, Kennedy saw them as necessary for frontier exploration. Military policymakers continued to latch on the idea of the frontier even in the relatively Earth-centric enterprises of rockets, communications, and weather spacecraft. Kennedy also called for the nation not just to explore space, but to control it, a uniquely military call to action. He closed the space portion of his address, saying, "no-one can predict with any certainty the ultimate meaning of mastery in space."[69]

Kennedy defended his space frontier aims further in a 1962 speech at Rice University saying, "No nation which expects to be the leader of other nations can expect

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[66] Ibid.
[67] John Kennedy, "Address to Joint Session of Congress May 25" (Speech, Congressional Session, JFK Presidential Library, May 25, 1961), https://www.jfklibrary.org/learn/about-jfk/historic-speeches/address-to-joint-session-of-congress-may-25-1961.
[68] Ibid..
[69] Ibid.

to stay behind in this race for space." Kennedy further confirmed his belief that the exploration of the space frontier would occur "whether or not the United States led it," and therefore it was imperative that the US and democracy be in charge of space instead of communism.[70] Kennedy ties the frontier effort directly to the Cold War fight against communism declaring, "If we are to win the battle that is now going on around the world between freedom and tyranny, the dramatic achievements in space which occurred in recent weeks should have made clear to us all, as did Sputnik in 1957, the impact on the minds of men everywhere who are attempting to make a decision on which road they should take."[71]

The Kennedy administration's space frontier analogy extended into military policy as a message of frontier supremacy in order to quash the rise of communism. In 1962, Kennedy explained his military vision for space, saying that "space supremacy is the aim of the next decade, and the nation which controls space can control the Earth."[72] The US military was meant to control the space frontier and exploit it for its purposes of intelligence, surveillance, reconnaissance, missile defense, and the securing of territory, be it orbital, lunar, or otherwise. Many, though not all, of the military programs of the 1950s and 1960s, represented stepping stones to achieving control of the space frontier.

Thus, while Eisenhower did not ascribe or promote the frontier analysis, Eisenhower's subordinate military and civilian space agencies, did adopt the concept of the frontier. In order to separate themselves from the previous administration, the Kennedy administration, championed by Lyndon Johnson, not only adopted the frontier analogy but cemented it forever in the national psyche. Even at present, the frontier analogy remains a viable policy narrative, with President Trump using it in his February 2020 State of the Union address to promote the US's return to the Moon.[73]

Military Influence

The US military has traditionally played an important role in the expansion of new frontiers. On the American continental frontier, the military, "…took on exploration

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[70] McCurdy, *Space and the American Imagination*, 163. Quoting John F. Kennedy, "Address at Rice University in Houston on the Nation's Space Effort." 12 September 1962, *Papers of the Presidents of the United States*, 1962 (Washington, DC: GPO, 1963), 373.
[71] Brinkley, *American Moonshot*, 257.
[72] McDougall, *The Heavens and the Earth*, 269.
[73] Donald Trump, "State of the Union Address", 4 February 2020.

missions such as Lewis and Clark's expedition, surveys for railroad routes by the topographical engineers, construction of navigable waterways by the Corps of Engineers, and protection of the pioneers."[74] When the American frontier closed in 1890, gone was the "perennial rebirth, this fluidity of American life, this expansion westward with its new opportunities."[75] As Americans settled across their new land, their dreams of expansion settled, but only temporarily. Soon, Americans felt drawn once again to the promise of a new frontier and one that was, at least in part, internationally acceptable to explore and colonize. In the early days of the US foray into space, the military believed they might be called upon to perform tasks in the space frontier similar to those on the western frontier, stewarding and guiding space exploration.[76]

There are two important goals laid out by science fiction as steps to expand the space frontier: control of the space around Earth and the establishment of military bases on the Moon.[77] These frontier goals provided something concrete and seemingly possible for Americans to aspire to and the military followed suit. As early as 1957, components of the DOD acknowledged the importance of a military base on the Moon as a goal. In a December 1957 meeting, the Air Force's scientific advisory board recommended both an "accelerated reconnaissance satellite effort and a 'vigorous' space initiative with an 'immediate goal of landing on the moon.'"[78] The following month, in January 1958, the Air Staff proposed five major space programs: "Ballistic test and Related Systems [*sic*], a lunar military base, manned hypersonic research, the Dyna-Soar orbital glider, and the WS-117L Satellite system."[79]

Unfortunately, the bifurcating of space responsibilities meant that some of these initiatives were dispersed to NASA or the Advanced Research Project Agency (ARPA). However, this does not negate the underlying premise of expansion into a space frontier as a way to "enhance national position and prestige."[80] Air Force generals, having

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[74] Hays, "Space and the Military," 153.
[75] McCurdy, *Space and the American Imagination*, 161.
[76] This sentiment has been revived with the creation of the Space Force in December 2019.
[77] McCurdy, *Space and the American Imagination*, 160.
[78] David N. Spires, *Beyond Horizons: A Half Century of Space Leadership*, 6th ed. (Maxwell AFB, AL: Air University Press, 1998), 56; "Report of the Scientific Advisory Board Ad Hoc Committee on Space Technology," Special Report (Air Force Scientific Advisory Board, December 6, 1957).
[79] Spires, *Beyond Horizons*, 56.
[80] McDougall, *The Heavens and the Earth*, 305.

seemingly bought into science fiction's proposal of the Moon as a strategic high ground within the space frontier, continued to promote the necessity of military-run lunar bases. The Air Force would ultimately forgo a lunar-basing project to focus on Earth-centric spacecraft and the Army would adopt the goal of lunar basing.[81] Under the policy drawn from the auspices of the frontier analogy, the DOD pursued three major programs: the Air Force's Manned Orbital Laboratory (MOL), the Army's lunar base program, Project Horizon, and both the Army and Air Force's pursuit of satellite-based communications.

In response to Kennedy's overall direction in space in 1963, Robert McNamara directed the development of the MOL.[82] The MOL was a crewed orbiting military space station that would be able to conduct a variety of military related missions from reconnaissance to offensive operations in and from its orbital position. In 1965, President Johnson explained to Congress that he specifically directed the DOD to continue with the development of the MOL even as most funding for crewed missions was allocated to NASA.[83] Johnson clarified that the MOL is a step in opening the space frontier, saying, "We dare not leave this area of our universe to become a monopoly in the hands of those who would destroy freedom. We must, therefore, obtain and maintain leadership for the free world in outer space, and we are trying to do that."[84] While President Nixon's administration ultimately canceled the MOL, its development during the Kennedy and Johnson administrations illustrated the military's attempts to adhere to a space policy of frontier expansion. It tied the military objective of securing outer space to that goal. However, MOL was just one program that aimed to achieve the goal of frontier dominance.

For many years, the popular belief was that the military wholesale withdrew its ambitions from the Moon after the establishment of NASA in 1958; this was not the case. The Army continued to pursue lunar basing secretly until the signing of the OST. Project Horizon, declassified in 2014, was an effort to place manned outposts on the Moon ahead

[81] James Killian, *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology* (Cambridge, MA: MIT Press, 1977), 129.
[82] Robert Frank Futrell, *Ideas, Concepts, Doctrine. Vol. 2: Basic Thinking in the United States Air Force, 1961-1984* (Maxwell Air Force Base: Air University Press, 1989), 678.
[83] Ibid., 681.
[84] Ibid., 681. Quoting Lyndon Johnson, *Department of Defense Appropriations for 1967: Hearings before a Subcommittee of the Committee on Appropriations*, 89th Congress, 2d Sess., 1966, pt 1:478-79

of the Soviet Union.[85] Under the auspices of Project Horizon, a lunar-based Moon-to-Earth bombing system, almost directly out of a Heinlein novel, was investigated.[86] Project Horizon was initiated as a concept in 1959, during the Eisenhower administration, and gained momentum after Kennedy's 1961 Moon speech.[87] Declassified project documents state its goal as the "operation of…a Moon to Earth baseline space surveillance system, facilitating communications with and observation of the Earth, facilitating travel between the Moon and the Earth, exploration of the Moon and further explorations of space, and defense of the base against attack if required."[88] The project aimed to begin Moon landings in 1965 and establish a lunar outpost by 1966.[89] The declassified data is unclear, but it is likely the project ran into funding and launch concerns as the NASA budget grew and the Army's space budget decreased. Ultimately, the project was cancelled. While the Army's lunar outpost did not materialize, it shows that the frontier analogy permeated not just the Air Force and NASA, but the Army as well. Though the MOL and Project Horizon were never actualized, some frontier related systems did survive.

A worldwide system of communication satellites was another part of Kennedy and Johnson's frontier visions the military pursued. Arthur C. Clarke, a preeminent science fiction writer of the pulp era, is directly responsible for the primary orbit of most military communication satellites.[90] Clarke even "joked that he gave away multibillion-dollar idea for forty bucks in 1945," the amount he was paid for his article on potential orbital options for artificial satellites.[91] In the article, Clarke describes what is now known as the geosynchronous orbit saying, "it will be observed that one orbit with a radius of 42,000 km has a period of exactly 24 hours. A body in such an orbit, if its plane coincided with that of the Earth's equator, would revolve with the Earth and would thus be stationary above the same spot on the planet. Moreover, a transmission received from

[85] Ben Brumfield, "U.S. Reveals Secret Plans for '60s Moon Base," *CNN*, August 25, 2014, https://www.cnn.com/2014/07/24/us/1960s-moon-military-base/index.html.
[86] Ibid.
[87] "Project Horizon," Vol 1: Summary and Supporting Considerations (US Army), accessed February 8, 2020, https://history.army.mil/faq/horizon/Horizon_V1.pdf.
[88] Ibid., 3.
[89] Ibid., 4.
[90] McDougall, *The Heavens and the Earth*, 352.
[91] Ibid., 352.

any point on the hemisphere could be broadcast to the whole of the visible face of the globe. A single station could only provide coverage for half the globe, and for a world service three would be required."[92] Throughout the early 1960s, military funding for communications fluctuated between second and third priority in the DOD, competing with military crewed spaceflight for primacy.[93] Communications satellites were vital to military operations on Earth as well as to secure the frontier of space. Science fiction's frontier analogy continued to encourage the idea that if the US did not capitalize on the new frontier of space, we would yield control of the frontier to the Soviet Union. Robert Heinlein's stories, among others, particularly emphasized this perspective, proposing that whoever controls space and the Moon has ultimate control over the Earth, a theme that was ultimately quashed with the signing of the OST. Despite the OST's declarations regarding national ownership of celestial objects, the notion of space as the "ultimate high ground," born out of the frontier spirit of expansion and control, remains to this day.

In reality, the frontier of space, especially for military activities, did not end up extending far afield from Earth. However, that did not stop policymakers from frequently evoking the frontier analogy, even in situations where it only tangentially applied. The frontier analogy evoked by science fiction led to national and military level policy choices to pursue programs in line with the goal of frontier expansion. Science fiction provided the lexicon and the shared technological frame by evoking a sense of American adventurism tied to the conquering of the unknown.

AE Framework Analysis

This section briefly analyzes the use of the frontier analogy against Khong's AE framework to determine if, and in what ways, policymakers used it.

Defining the situation for the policymaker

The frontier analogy indeed described the space environment for policymakers. It described the space domain much like the Western frontier, a place that was ripe for

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[92] "Sir Arthur C. Clarke — Space Age Visionary," ITU News Magazine, accessed February 13, 2020, https://www.itu.int/itunews/manager/display.asp?lang=en&year=2008&issue=03&ipage=Arthur-Clarke&ext=html.
[93] Spires, *Beyond Horizons*, 292.

human exploration and expansion. The frontier analogy also invoked a sense of manifest destiny, making it an area that the US must have a semblance of control over lest another country seize the territory first, and set the international rules. Invoking the idea that space was a place to control, much like the Western frontier, meant that it was a national imperative to explore and control the space frontier. Science fiction provided the lexicon and shared technological frame of the space frontier, which policymakers used to direct programs and resources. Additionally, the future analogy of the space frontier represented a way for policymakers to interpret the domain as an extension of previous beliefs in the absence of previous experience.

Assess the stakes

Science fiction promoted the idea that if the US were not the first to explore and secure the new frontier of space, then they would essentially cede control of it to another. In the technocratic fervor of the age, the policymakers leveraging science fiction tied the idea to the Cold War, insinuating that failure to explore and control the space domain meant subjugation by communism. By bombarding policymakers and society with fictional tales of what might happen if America did not control the space frontier, the future analogy exacerbated existing Cold War fears and contributed to policymakers assessing the stakes of space control as critical. This assessment on the criticality of the space frontier led policymakers to pursue aggressive and expensive civilian and military pursuits that may have hampered space development in the out years.

Provide prescriptions

Policymakers used science fiction both directly and indirectly. In many cases, policymakers took initiatives right off the pages of science-based stories. For example, science fiction articulated the goals of control of the space around earth and the establishment of lunar colonies as the building blocks for frontier expansion. Policymakers took these prescriptions and tried to actualize them by pursing military-run, Earth-centric spacecraft and lunar bases. Additionally, policymakers often used soft science fiction examples indirectly to infer what type of space program they did not want. For example, many policymakers did not want to embark on a "Buck Rogers" space expedition, indicating a preference for a more serious scientific pursuit. The fact that

ideas were often dismissed at high levels of government as "Buck Rogers" stuff suggests that the fictional tales were popular enough that constraints on space policy could be defined in those terms. While high-level officials referring to Buck Rogers does not prove they read the tales, it does illustrate policymakers' familiarity with the narratives and terms being constructed in these fictional space stories. Much like strategists' use of analogies of bloody past wars such as "Vietnam," or "trench warfare of WWI" to avoid a decision to commit military forces, bad (or soft) science fiction was used as a means to illustrate what policymakers did not want. Therefore, they leveraged the soft science fiction of "Buck Rogers" as a means to shape the boundaries of the space policy environment.

Predicting success

The frontier analogy does not directly predict a chance of success, but it does evoke an understanding of the difficulty of the endeavor. The frontier analogy also predicts the chance of success if there is no US expansion into space, namely zero. The frontier analogy is backstopped by the idea that if the US is not first to expand into the new frontier of space, then the Soviet Union will control the new frontier.

Evaluating moral rightness

The frontier analogy is used much in the same way as above to show the moral necessity of the frontier and the moral rightness of America's pursuit of it. If America does not pursue the space frontier and the Soviet Union obtains control of the domain, communism wins. The future frontier analogy continued to play on the Cold War dichotomy of democracy versus communism and placed space squarely in the middle. This sense that we must expand into space first to ensure the success of American ideals and democracy was a significant driver behind the space race. The creation of a moral imperative by the frontier analogy actually creates a situation that makes it difficult for policymakers to explore other policy choices under the fear that they might be seen as a communist sympathizer.

Warning about the dangers of other options

The space frontier analogy does not warn about the dangers associated with other options, only that there are no other options for policymakers to consider. If America does not pursue the space frontier, communism wins. The frontier analogy allows no other alternatives, and is thus in some instances, limits the perspectives and analysis of policymakers.

Conclusion

The idea of the space frontier in this form remained prevalent for a decade until the Apollo Moon landings. As the nation remained embroiled in Vietnam, the country decided it was time to spend money and resources elsewhere. The idea of using space to bring peace to the world resonated more than that of frontier domination during the late-1960s and early-1970s. However, the idea of the space frontier never entirely disappeared, it merely retreated to the realm of science fiction, echoed weekly in *Star Trek* episodes. Recently, the space frontier has returned from its science fiction hibernation back into the social and political sphere of the US. As the US returns to the Moon and sets its sights on Mars, the space frontier analogy is slowly gaining prevalence once again. It would be wise to remember that the Manichaean choices of democracy versus communism and spending government funds on space versus Earth-based programs portrayed in the first use of the analogy may not be real. It is possible to explore the space frontier and improve American lives on Earth at the same time; they are not mutually exclusive political and social goals.

Chapter 4

The Nuclear Apocalypse Analogy

The universe grows smaller every day – and the threat of aggression by any group anywhere can no longer be tolerated. There must be security for all – or no one is secure. It is no concern of ours how you run your own planet, but if you threaten to extend your violence, this earth of yours will be reduced to a burned-out cinder.

Harry Bates (Klaatu), *The Day the Earth Stood Still*

Cold War anxiety reached its height in the national psyche from the late 1940s through the 1960s. The space frontier analogy leveraged this anxiety to inspire exploration and expansion efforts in space. The nuclear apocalypse analogy presents another dichotomy, but a more nuanced one: on one side, there is the dystopian expectation of a nuclear apocalypse; on the other side, a utopia brought about by the peaceful use of outer space. The space frontier analogy is a historical analogy that was shaped into a future for the space domain. The nuclear apocalypse analogy a future analogy based on fears generated by the use of the atomic bomb at Hiroshima and Nagasaki. While the fears of a nuclear apocalypse were real, they also represented a metaphor of society and civilization on the edge of disaster. In its analogous form, the nuclear apocalypse represents a precipice. Society can choose to press forward on its current path of military aggression and fall into a world of total destruction, or it can choose to step back from that precipice by choosing peace. Nuclear technology is unique in that it was an invention born out of the need for war and destruction, rather than a civilian technology adapted for military use.[1] There is a plethora of dystopian science fiction dealing with the theme of a nuclear apocalypse, this paper focuses on the nuclear theme in science fiction using the space theme. However, even among the space-themed nuclear fiction this paper only captures a small segment of the genre dealing with a nuclear analogy, as it itself is expansive in its direct and allegorical applications.

The future analogy created by science fiction was used in three ways: first, the future world is destroyed by nuclear weaponry in space. In the aftermath of *Sputnik*, this

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[1] Stephen Miller, "Cyber Threats, Nuclear Analogies? Divergent Trajectories in Adapting to New Dual-Use Technologies," in *Understanding Cyber Conflict: Fourteen Analogies*, ed. George Perkovich and Ariel Levite (Washington D.C.: Georgetown UP, 2017), 161.

form of the analogy was prevalent and fueled the fear that a nuclear attack might arrive suddenly from a space-based platform, without warning and with no opportunity for recourse or retaliation. Second, science fiction of the pulp era often portrayed a world where nuclear weapons have destroyed Earth and space is the last refuge for humankind. Third, science fiction presents the idea of a world where the Earth is, or could have been, saved through international unification. These three forms of the nuclear apocalypse analogy helped frame acceptable solutions for policymakers, enabling them to grapple with the consequences of continuing on the current path of space weaponization. The analogies of Vietnam, Munich, or Pearl Harbor evoke images of historical situations wherein policymakers tried to apply lessons learned to avoid mistakes.[2] Correspondingly, future visions of a nuclear apocalypse create an analogy born out of a fictional future that policymakers similarly tried to avoid. The primary lesson that policymakers seemed to take from the apocalypse analogy was that, on some level, international cooperation had to be achieved and that restraining military activity in space was one way to achieve cooperation and avoid the apocalypse.

The dystopian stories of nuclear apocalypse used Cold War tension to temper and limit military space policies. The nuclear apocalypse portrayed in fictional stories was one where the use of nuclear weapons triggers the collapse of civilization, either within the US or worldwide. The analogy of a nuclear apocalypse played on the same dialectic, between democracy and communism, between freedom and tyranny, as the frontier analogy, but its influence on space policy is constraining, rather than progressive.[3] Walter McDougall suggests this, saying that, to some, the space age which *Sputnik* initiated was a symbol of "mankind's irrepressible, questing nature."[4] Furthermore, after *Sputnik*, many in Congress, the military, and the American public had a "vision of heavily armed satellites, perhaps with nuclear warheads" encircling the Earth.[5] For many segments of society, the flight of *Sputnik* framed against the backdrop of the Cold War brought about

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[2] Yuen Foong Khong, *Analogies at War: Korea, Munich, Dien Bien Phu, and the Vietnam Decisions of 1965* (Princeton, N.J.: Princeton UP, 1992), 4–5.

[3] Douglas Brinkley, *American Moonshot: John F. Kennedy and the Great Space Race* (New York, NY: Harper, 2019), 257.

[4] McDougall, *The Heavens and the Earth*, 4.

[5] Alfred K. Mann, *For Better or for Worse: The Marriage of Science and Government in the United States* (New York: Columbia UP, 2000).

"social, political, and psychological effects," that engendered a "global consciousness."[6] This global consciousness culminated for space policy in the signing of the 1967 OST and the formal declaration that space is "the province of all mankind."[7]

Social Influence and Perspectives

Throughout the 20th century and well before scientists developed the atomic bomb, superweapons were a theme of imaginary war stories. H.G. Wells capitalized on the imagery of atomic weapons destroying civilization in his popular 1914 tale, *The World Set Free.* The use of superweapons as a literary trope was not prevalent until John Campbell, the publisher of *Astounding Stories,* began deliberately filling his magazines with the superweapon theme. Campbell is credited with driving atomic imagery into the early science fiction stories of the 1930s and 1940s, being one of the few, if not the only, science fiction publisher to run stories about atomic weaponry consistently.[8] The secrecy of the Manhattan Project meant that government officials did not discuss nuclear technology in public forums; this secrecy allowed science fiction to fill the gap, developing a shared narrative and a technological frame to begin a public discourse about nuclear weaponry and its implications. Bruce Franklin, in his book *War Stars,* asserts that "during these five years, the only Americans exposed to any public thought about atomic weapons were the readers of science fiction."[9]

Robert Heinlein's 1940 tale "Solution Unsatisfactory" significantly contributed to the discussion regarding the ramifications of nuclear weapons.[10] Tom Shippey writes that "even in 1941... Heinlein was trying hard and deliberately to make, through fiction, a true statement about the nature of his own society: that if technology changed, his society's foreign policy would change, would have to change, and its morality and constitution and everything else with it."[11] Campbell contends that "Solution

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[6] McDougall, *The Heavens and the Earth*, 4.

[7] Bureau of Arms Control, Verification and Compliance, "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies."

[8] Brian M. Stableford and David Langford. "Nuclear Energy." *The Encyclopedia of Science Fiction* edited by John Clute, David Langford, Peter Nicholls, and Graham Sleight. London: Gollancz, updated 12 August 2018. Web. Accessed 24 February 2020. <http://www.sf-encyclopedia.com/entry/nuclear_energy>.

[9] H. Bruce Franklin, *War Stars: The Superweapon and the American Imagination* (Amherst: University of Massachusetts Press, 2008), 146.

[10] Seed, *American Science Fiction and the Cold War*, 31.

[11] Tom Shippey, "The Cold War in Science Fiction, 1940–1960," in *Hard Reading: Learning from Science Fiction* (Liverpool, UK: Liverpool University Press, 2016), 210.

Unsatisfactory" "was read, and widely discussed, among the physicists and engineers working on the Manhattan project."[12] Campbell likely inferred his assertion from the "suspicious clustering [of subscriptions] around a post office box in Santa Fe," and the significant number of copies sold, "at the drugstore near Oak Ridge National Laboratory."[13] The employment of the atomic bomb during WWII confirmed not only Heinlein's technical predictions, but also his social prophecy "that the existing social and political systems weren't up to the task of controlling it [the bomb]."[14]

The dystopian nuclear apocalypse trope regained its mainstream popularity in the post-WWII milieu of American culture as a poignant perspective of the technology. Disch writes that "necessarily the science fiction of that era was pervaded by the same dread of nuclear apocalypse" present throughout the country and the world.[15] After the US's use of atomic bombs in WWII, Campbell made it his life's mission to use science fiction to "save mankind from the bomb."[16] Campbell's quest was realized a year later in 1946 when hundreds of books and stories about the future use of nuclear weapons were published, further flooding popular culture and discourse with stories of nuclear apocalypse. These stories provided a starting point for the public and politicians to articulate their nuclear fears. The fiction also provided seemingly feasible solutions to counter the apocalypse, one of the most popular being the involvement of the space domain, either as a means of control or, in later years, as one of peace. Heinlein, also extremely shaken by the atomic bomb, found a renewed purpose in his writing after WWII and aimed to directly influence the public and political discourse in a way that might forestall the apocalypse.[17]

The dropping of the atomic bombs in Japan created a fundamental sense of fear and despair in Heinlein. After WWII, Heinlein became a self-proclaimed hawk, advocating for war or war-winning capabilities to prevent a nuclear apocalypse.[18] He dedicated himself to writing science fiction tales that advocate for the "perpetuation and

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[12] Franklin, *War Stars*, 142.
[13] Nevala-Lee, *Astounding*, 197.
[14] Ibid., 214.
[15] Disch, *The Dreams Our Stuff Is Made Of*, 82.
[16] Nevala-Lee, *Astounding*, 214.
[17] Ibid,, 163–67.
[18] Disch, *The Dreams Our Stuff Is Made Of*, 164.

growth of the military-industrial complex," something he believed was the only avenue to ensure America was protected from nuclear apocalypse.[19] Heinlein's nuclear fear permeated his work, evident in tales such as "The Long Watch," *Space Cadet,* and *Rocketship Galileo*, which focused on the use of nuclear weapons on the Moon. Other Heinlein works such as *Farnham's Freehold* focused on life after a nuclear apocalypse. Heinlein's popularity in the US meant that his stories helped articulate, and in some cases exacerbate, the nuclear fears of the American populous. Heinlein fervently believed that only a "Pax Americana backed up by nuclear superiority could secure world peace."[20] Ultimately, under the US' nuclear umbrella, the nation eventually formed a Pax Americana through international institutions, in part with the help of the nation's commitment to the idea of space for peaceful purposes.

Outside of Heinlein's goal of promoting a Pax Americana, other popular nuclear apocalypse stories focused on the promise of space as a refuge from a destroyed Earth. In 1946, Ray Bradbury wrote a short story called "The Million Year Picnic," which he would eventually incorporate into his more famous 1950s tale, *The Martian Chronicles*. In "The Million Year Picnic," Earth's civilization is destroyed, and the story is told through the viewpoint of the survivors who escaped to Mars.[21] Stories of a nuclear apocalypse were prevalent in all of the mainstream science fiction magazines. By the end of the 1940s and into the 1950s, it was not just science fiction magazines that were publishing tales of nuclear apocalypse and life in an atomic future, but mainstream magazines and newspapers. Most famously, *Life* magazine published a story called "The 36-Hour War" where a mysterious enemy starts a nuclear war by launching ballistic missiles at the US from secret sites in Africa.[22] The *Life* magazine story illuminates how ingrained science fiction imaginings of superweapons and the potential for nuclear apocalypse was throughout American culture.[23] Nevertheless, the lexicon and central narrative components built on Wells and the stories Campbell published in the 1930s and 1940s, solidifying the general themes for public discourse regarding the nuclear

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[19] Ibid., 165.
[20] Ibid., 169.
[21] Franklin, *War Stars*, 159; Will Elder et al., *The Million Year Picnic, and Other Stories* (Seattle: Fantagraphics Books, 2017).
[22] Franklin, *War Stars*, 157.
[23] Ibid., 157.

apocalypse analogy. Franklin writes in his study of nuclear culture that "from 1945 on, all serious political discourse would have to participate in this genre [science fiction], for the forms and consequences of future weapons would be central to national and international policy."[24] The pervasive nature of fictional themes intruding on political discourse was reinforced with the launch of *Sputnik*. The Soviet Union's foray into space altered the analogy slightly from one of inevitable nuclear apocalypse to a choice between space as an instrument of the apocalypse or as a place for nations to unify in peace.

Though science fiction leveraged space in its apocalyptic storylines, *Sputnik* was the catalyst for the general populous to seize on those stories as they directed their attention, fears, and, because of science fiction, their hopes, towards space. Sharon Weinberger says that "Sputnik tapped into a narrative that artfully wove Hollywood, science fiction, and good old-fashioned fear mongering."[25] By 1957, Americans had become relatively complacent with all the other, "normal" ways nuclear weapons might be delivered such as by air or missile. *Sputnik*, however, was a visual representation of the Soviet Union's potential reach into the US and it indelibly tied spaceflight to the broader Cold War rhetoric. Many science fiction authors again took an active role in trying to prevent the nuclear apocalypse by exacerbating the existing Cold War fears and then pressing for rational policy.

Most science fiction of the 1950s and 1960s is not presented in a utopian storyline but instead portrays utopian visions as a means to thwart a nuclear apocalypse. To be sure, there was an economic incentive to propagating the nuclear apocalypse analogy in science fiction; utopian stories did not sell well, coming off as "preachy, undramatic…and terminally genteel."[26] Thus, science fiction authors of the pulp era generally identified space as a viable pathway for a sane nuclear policy as the moral of the dystopian story. Since space was a region not yet tarnished by humans, it might be preserved for all humankind, but only if policy restraints prevented nuclear proliferation in space. The message of a peaceful space domain as a utopia permeated through many of the fictional futures as the Manichaean alternative to nuclear apocalypse. Oliver Morton,

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[24] Ibid., 157.

[25] Sharon Weinberger, *The Imagineers of War: The Untold Story of DARPA, the Pentagon Agency That Changed the World* (New York: Vintage, 2018), 35.

[26] Disch, *The Dreams Our Stuff Is Made Of*, 104–5.

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in his book *The Moon*, explains that "space travel and superweapons form a science-fiction double act, with the rockets that might prosecute a nuclear war reinterpreted as the means of escaping it."[27] The image of space as a utopia functioned as a parable for society, if only humans learned to cooperate in space. Morton writes in an editorial that Heinlein's "*Rocket Ship Galileo* used the Moon not only as a way of thinking about the prospect of nuclear war, it also made it a way of understanding the aftermath."[28] Heinlein explains in *Rocket Ship Galileo*, "The moon people ... ruined themselves. They had one atomic war too many."[29] Heinlein's cautionary tale illustrates the damage nuclear weapons in space might cause both physically and psychologically. *Rocket Ship Galileo* is followed by another Heinlein tale, *Space Cadet,* where the cadets are assigned to "space patrol," a unified Earth-wide military force that controls all nuclear weapons to preserve peace. Other science fiction stories of the era take Heinlein's ideas about a unified military force a step further and use the idea of a united Earth as a central theme.

The idea of a unified international society is a common counter-balance to the nuclear apocalypse in science fiction of the 1940s through the 1950s. An exemplar of such a tale is the science fiction short story "The Day the Earth Stood Still" by Harry Bates, which was transformed into a popular 1951 science fiction film with the same name. In the movie, an alien envoy arrives on Earth to inform the Earthlings that his race will "not tolerate an extension of human violence into space."[30] Another variation of the unification theme appears in *Earthlight*, a 1955 novel by Arthur C. Clarke, where a united Earth competes with the settlers of the solar system for rare metals and other resources. Clarke's tale introduces the quandary of ownership over rare resources from space and predicts that space resources will become a source of conflict. The conflict

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[27] Morton, *The Moon*, 180.

[28] Oliver Morton, "Lunacy: How Science Fiction Is Powering the New Moon Rush," *The Guardian [Online]*, May 18, 2019, https://www.theguardian.com/books/2019/may/18/a-new-chapter-in-space-travel-why-science-fiction-is-powering-a-moon-rush.

[29] Morton, "Lunacy."; Robert A. Heinlein, *Rocket Ship Galileo* (New York: Ace Books, 2005).

[30] Peter Nicholls, John Brosnan, and Nick Lowe. "The Day the Earth Stood Still," *The Encyclopedia of Science Fiction* edited by John Clute, David Langford, Peter Nicholls, and Graham Sleight (London: Gollancz) updated 14 January 2017. Web. Accessed 24 February 2020. <http://www.sf-encyclopedia.com/entry/day_the_earth_stood_still_the>.

over future resources garnered from space is one of the key concerns the OST tries to mitigate.

Oscar Schacter introduced the concept of space sovereignty in his chapter in *Across the Space Frontier,* titled "Who Owns the Universe?" In this chapter, Schacter imagines a future where space resources "belong to all mankind, and no nation."[31] It is in this chapter that Schacter compares the principles of sovereignty used in the "open seas to outer space and other celestial bodies."[32] He promulgates the idea that sovereignty over any part of the space domain must be eliminated, saying that in space, there should be the idea of "free and equal use rather than exclusive possession."[33] Schacter's future space domain is one where, "interference with [such] travel would be prohibited, and governments would not have the right to appropriate portions of space."[34] He proposes that military spacecraft, especially ones capable of carrying nuclear weapons, must have special rules. In his imaginary future, he supposes that "when one conceives of a rocket ship or space station operating far above the earth [sic] with bombs of mass destruction, it is obvious that the potential danger to mankind would far exceed that which could be caused by a ship of war on the high seas."[35] In this simple sentence, Schacter makes the explicit argument that spacecraft are inherently more dangerous than naval ships, regardless of future technology developments. Schacter's sentiment that military space activity is inherently more dangerous than similar activity in other domains permeates military space policy to this day. It restricts both nuclear and conventional military space technology in a way that naval, air, and land-based technology development were not similarly constrained. Schacter's views were primarily disregarded as a pleasant fiction in 1952 when there was little political or social desire to limit America's ability to pursue manifest destiny on its terms. In a post-*Sputnik* world, however, his imaginings of the future, coupled with his position on the UN as a legal counselor, had far-reaching impacts.

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[31] Kaplan et al., *Across the Space Frontier*, 122.
[32] Ibid., 122.
[33] Ibid., 122.
[34] Ibid., 122.
[35] Ibid., 125–26.

The science fiction stories of nuclear apocalypse balanced themselves with the utopian hope for peace. After *Sputnik*, many stories had space playing an active role in nuclear destruction, while some tales had space as a refuge, a place where humans might go to escape the horrors of Earth. Other science fiction stories promoted the utopian vision using the threat of an outside invader that forces humans to unite against the threat of an alien invasion. Though the tales of alien invasion are not utopias, their message promoting the unification of the human race resonated with many Americans as an ideal solution to their nuclear anxiety. Furthermore, government secrecy surrounding nuclear weapons meant that the social discourse during the early-1940s was primarily driven by science fiction. As the work on actual nuclear weaponry became public in 1945, science fiction remained a prevalent foundation for the discourse, both political and social, surrounding nuclear weapons and the potential use of space as a means to forgo a nuclear apocalypse.

Influence on Policymakers

The dropping of atomic weapons at the end of WWII had an immense effect on US policymakers.[36] The emotional effect of the war combined with dystopian narratives from science fiction permeated society. The dystopian narratives showed a bleak future of total nuclear destruction if nuclear weapons were deployed in space. In his memoir, Eisenhower's Science Advisory Committee Chairman, James Killian admitted that "the news of Sputnik found me—and most of the nation—psychologically vulnerable and technically surprised."[37] The relative surprise of *Sputnik* exacerbated both the fear of nuclear apocalypse and the ever-present Cold War anxiety over boundaries and the spread of communism. Douglas Field writes that "The political and cultural period from 1947-mid 1960s is characterized by a rhetoric of containment, a doctrine that sought to stem the red flow of communism."[38] *Sputnik* represented a means to obviate the boundaries the US meant to secure by containment and therefore necessitated a political response.

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[36] James Killian, *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology* (Cambridge, MA: MIT Press, 1977), 111.
[37] Ibid., 111.
[38] Douglas Field, *American Cold War Culture* (Edinburgh, Scotland: Edinburgh University Press, 2005), 2.

While scientists and engineers invoked the space frontier analogy arguing for "supersession of the boundaries of earthly knowledge and experience – and the development of a set of technologies by means of which they might be traversed."[39] Politicians and government lawyers argued using the nuclear apocalypse analogy, trying to determine "how to secure state authority by delineating and categorizing the space that technology had threatened to open up."[40] Craven writes that Schacter's science fiction was "remarkably prescient, anticipating by over a decade many of the key features of the new code for outer space."[41] Schacter's position within the UN likely played a role in his influence on space policy as well. His official duties provided the pathways for his fictional musings on space to become a reality, musings which sought to obviate the role of sovereignty in space, preserving the domain of all of humankind.

In the late 1950s, containment efforts were on-going, but space held a unique symbolic position in the endeavor. Science fiction proposed a means to contain Soviet nuclear expansion in space by preserving the domain for all of humankind. Serving more as a metaphor for peaceful world unification than perhaps a real means to accomplish the goal of world peace, the peaceful use of space rhetoric began infiltrating domestic and international political circles. Within a year of *Sputnik*'s launch, the UN formed the Committee on the Peaceful Use of Outer Space (COPUOS).[42] Matt Craven's study on the development of the legal framework for space reveals that COPUOS was initially formed to address two issues "First, the question of ownership or sovereignty in outer space and, second, the problem of its potential militarization."[43] While these two issues are interrelated, this chapter focuses on the latter.

The initiation of the space program under Eisenhower started before *Sputnik* and had four primary objectives, one of which was directed to the military. The initial military space objective was broad, "to be sure that space is not used to endanger our security," and authorized the DOD to pursue a myriad of space programs.[44] The

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[39] Matt Craven, "'Other Spaces': Constructing the Legal Architecture of a Cold War Commons and the Scientific-Technical Imaginary of Outer Space," *European Journal of International Law* 30, no. 2 (2019), 549.
[40] Ibid., 549.
[41] Ibid., 552.
[42] Craven, "Other Spaces," 552.
[43] Ibid,, 553.
[44] Killian, *Sputnik, Scientists, and Eisenhower*, 289.

administration also identified that "if space is to be used for military purposes, we must be prepared to defend ourselves."[45] Science fiction's nuclear apocalypse analogy fostered the fear that "a nuclear power might be in a position to launch guided missiles from a space platform to any point on earth with barely any possibility of response, that outer space would be filled with 'orbiting bombers' or that the moon would become the site of military rocket installations."[46] Eisenhower's nuclear policy of all or nothing war with Russia might have been strengthened by the presence of nuclear weapons in space, but it was not something he actively pursued. Though Eisenhower was viewed as a lackluster supporter of the idea of space as a frontier, he did permit research into many of the military space weapons programs such as Project BAMBI (Ballistic Missile Boost Intercept) which was meant to destroy Soviet missiles from space immediately after launch. He saw with utmost urgency that the US must have satellite technology that could detect and observe nuclear deployments and explosions. Research into the detection of nuclear explosions and the deployment of such technology were the impetus behind the MIDAS (Missile Launch Detection Alarm System) program. Thus, in the early days of COPUOS, the US was actively pursuing a variety of space weapons and weapon support platforms. While the drive towards the peaceful use of outer space gained initial momentum during Eisenhower's tenure, it gained speed under President Kennedy's administration.

Under President Kennedy, the nation pursued a policy that necessitated some restraint from the military space program. Kennedy's nuclear restraint was applied unevenly across domains, with space bearing most of the burden, due to the quest to identify the space domain as a place for "peaceful" activities.[47] The identification of the space domain as peaceful set it apart from other military domains, necessitating a more restrained military approach.[48] Ultimately, Kennedy's quest for peace in outer space generated positive domestic and international benefits for the administration, such as allowing overflight and therefore a means of observing the Soviet Union from space for arms treaty verifications, among other purposes. The quest for the peaceful uses of space

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[45] Ibid., 289.
[46] Craven, "Other Spaces," 557.
[47] Craven, "Other Spaces," 557.
[48] Ibid., 558.

allowed Kennedy to further expand the Pax Americana into the space domain, something that was only possible as long as the United States, not the Soviet Union, had control over space.[49] Leveraging the nuclear apocalypse analogy, Kennedy ushered in an era where space was regarded as an international domain of peaceful sanctuary, not yet tarnished by humankind, where US military restraint would unite the international community and in turn, contain the Soviet Union.

Military Influence

In August of 1945, General "Hap" Arnold announced that the US Army Air Forces was "already secretly experimenting with 'Buck Rogers things' such as missiles that would be able to hit any target in the world."[50] Speaking over a decade before *Sputnik*, General Arnold does not explicitly mention any Army Air Force plans for space. However, by invoking Buck Rogers, a soft science fiction space opera, his words inherently link the Army Air Corps (soon the be Air Force) missile program with space.

Shortly after *Sputnik*, military rhetoric changed drastically. After the formation of the COPUOS, President Eisenhower charged the National Aeronautics and Space Council to review his standing space policy.[51] Unsurprisingly, the group of civilians urged a shift to more peaceful space activity. In 1958, the DOD began discussing the importance of the peaceful use of outer space publicly. In a meeting with then US Air Force Vice Chief of Staff General Curtis LeMay, Deputy Secretary of Defense Donald Quarles directed the general to "not consider satellites as weapon platforms."[52] David Spires writes in his study of Air Force space leadership "Air Force leaders would continue to find that the policy of 'peaceful uses of outer space' embraced the development of reconnaissance systems but never offensive weapon systems."[53] On 26 January 1960, the NSC approved and published a directive on the "US Policy on Outer Space."[54] Frustrating military leaders, this policy highlighted peaceful space development

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[49] Ibid., 563-564.
[50] Franklin, *War Stars*, 156.
[51] David N Spires, *Beyond Horizons: A Half-Century of Space Leadership*, 6th ed. (Maxwell AFB, AL: Air University Press, 1998), 80.
[52] Ibid., 55.
[53] Ibid., 55.
[54] Ibid., 80.

and exploration and constrained the development of on-going space research programs, even ones meant to further interplanetary travel and defense.[55]

Following the 1960 policy on outer space, Air Force leaders began campaigning for expanded military space missions and programs.[56] Lieutenant General Bernard Schriever famously declared, "I think we have been inhibited in the space business through the 'space for peace' slogan."[57] Schriever went on to call the policy "an unnecessary self-imposed restriction…namely the artificial division into space for peaceful purposes and space for military uses when in fact, no technical and little other distinction between the two exist."[58] Other Air Force officials also argued that the "narrowly-construed 'space for peace' policy prohibited the development and deployment of offensive space systems that could deny the Soviets space superiority."[59] The Air Force leader's arguments to Congress and the presidential administration included the assertion that an offensive military mission could ensure peace in space, much like the theory behind the SAC nuclear bombers at the time, with the motto of 'Peace is our Profession.'[60] Maintaining offensive weapons to ensure peace worked for the air domain, but the same argument did not hold for space.

The Air Force's argument garnered too much publicity, and, in 1962, a *New York Times* article on the militarization and control of space created a public outcry that the Defense Department was "in violation of the administration's declared use of space for 'peaceful purposes.'"[61] Less than a year later, the Partial Test Ban treaty was signed, and five years later, the OST was ratified by both the US and the Soviet Union. In their final forms, neither the Partial Test Ban Treaty nor the OST banned either offensive or defensive military weapons in space. Nevertheless, this did not stop domestic policymakers from imposing stricter restrictions on the DOD's development of space

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[55] Ibid., 80.
[56] Spires, *Beyond Horizons*, 100.
[57] Ibid., 101. General Schriever would go on to pick up his fourth star the following year, so the statement did not seem to impair him politically.
[58] Ibid., 101.
[59] Ibid., 100.
[60] Ibid., 100; "Strategic Air Command," accessed February 25, 2020, http://www.strategic-air-command.com/.
[61] Spires, *Beyond Horizons*, 109.

weapons, even those defensive in nature.[62] The dominant and pervasive dystopian imagery of the world after a nuclear apocalypse played on national fears and necessitated a military policy to alleviate those fears.[63] In this way, the public nature of the national space program and its designation as an area of peace made the military space component a convenient artifact of change. The tension between the "space for peace" policy and the type of military space development identified by Schriever had a lasting and limiting impact on the military space program. Research into several non-nuclear space programs was canceled, even though the programs were not banned outright by the OST, because of their potential for nuclear escalation. While the nuclear apocalypse analogy restricted space programs to a monitoring and intelligence role, all other domains received no such restrictions. Bomber technology continued to improve and the Navy continued to develop nuclear ballistic missile submarines with its Trident missile program. The limiting of military space missions pacified the domestic and international concerns of immediate nuclear death, while other domains continued to develop more advanced and less detectable nuclear delivery platforms.

The first project to be canceled under the guise of the OST was Project Orion, a nuclear-propelled spacecraft meant to take military and civilian astronauts to Mars. This project is reminiscent of Clarke's 1947 tale *Prelude to Space* about preparations for a Moon mission, where "atomic power makes interplanetary travel not just possible but imperative."[64] The APRA and Air Force collaboration lasted seven years from 1957 to 1965 with General Thomas Power, the head of Strategic Air Command at the time, exclaiming, "whoever builds Orion will control the Earth."[65] The Orion spacecraft was designed to operate by dropping a nuclear bomb "out the stern of the ship, and when it reaches a preprogrammed distance, the bomb [would] detonate," imparting incredible thrust and therefore speed to the spacecraft.[66] Defense Secretary Robert McNamara

[62] Bureau of Arms Control, Verification and Compliance, "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies."
[63] Juan C. Lucena, *Defending the Nation: US Policymaking to Create Scientists and Engineers from Sputnik to the "War Against Terrorism"* (Lanham, MD: Univ. Press of America, 2005), 156.
[64] Morton, "Lunacy: How Science Fiction Is Powering the New Moon Rush."
[65] Franklin, *War Stars*, 191.
[66] David Szondy, "To the Stars by Atom Bomb: The Incredible Tale of the Top Secret Orion Project," *New Atlas Magazine*, June 6, 2017, sec. Space, https://newatlas.com/orion-project-atom-bomb-spaceship/49454/.

refused to fund Project Orion, declaring that nuclear space propulsion was unnecessary and not a priority for military space endeavors.[67] The Navy's nuclear-powered submarine, the USS *Nautilus*, developed in 1954, and the Trident nuclear ballistic missile, initially developed in the mid-1960s though not deployed until the late-1970s, did not face similar resistance.[68] The OST does not ban nuclear propulsion and, reportedly, "the Orion team did regard the project as a way to use nuclear weapons for peaceful purposes."[69] However, the Partial Test Ban Treaty of 1963 banned the testing of nuclear weapons in outer space. While Orion's propulsive explosions were not weapons, per se, the imagery of a spacecraft carrying nuclear explosives as space-based propulsion was an optic that, when coupled with the prevalent fictional sci fi stories and Kennedy's policy choices, could not be overcome. The cancellation of Project Orion relegated US launch and space thrust systems to that of the standard V2 chemical propellant, a standard that remained for decades, partly due to a political aversion to nuclear-fueled space propulsion.

Another program canceled under the "space for peaceful purposes" policy was Project BAMBI, the Air Force program associated with ARPA's Project Defender, designed to stop Soviet missiles immediately after launch during their boost phase. BAMBI would have provided the US with enormous defensive capabilities against the Soviet missile threat, but it was in direct contradiction to Kennedy's nuclear policies of mutually assured destruction. As the Apollo program ramped up and required more of the national space budget, the Defense Department went looking for programs to cut.[70] Cutting funds to BAMBI in 1963 was probably an easy political decision, despite the Air Force's protests. It was an expensive program that did not further the President's domestic or international policy posture, as it did not assist national leaders in convincing the international community to sign a treaty for the peaceful use of outer space. Most of BAMBI's research and development data was given to NASA to improve their crewed

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[67] Szondy, "To the Stars by Atom Bomb"; Gerald T. Cantwell, "The Air Force in Space Fiscal Year 1963" (Washington, DC: USAF Historical Division Liaison Office, December 1966). Classified TOP SECRET. The excerpt is declassified, 6.

[68] "Trident Missile," in *Encyclopædia Britannica* (Encyclopædia Britannica, inc., August 22, 2013), https://www.britannica.com/technology/Trident-missile.

[69] Szondy, "To the Stars by Atom Bomb."

[70] Spires, *Beyond Horizons*, 123.

rendezvous and proximity operations.[71] BAMBI's sister project, MIDAS, fared better during the space for peace drawdown.

The MIDAS program survived the budget cuts of the 1960s and its technology of infrared sensing of missile launches is still used in modern missile warning satellites. MIDAS was a unique defense program in that it helped alleviate the fear of a nuclear apocalypse by providing a warning, but at the same time did not upset the goal of the peaceful use of outer space. The development of the space-based infrared satellites was tested with MIDAS and transitioned the technology into the next iteration of the capability, the Defense Support Program (DSP). MIDAS proved to policymakers that missile verification was possible and it provided security without provocation, as a means to validate the Test Ban Treaty.[72] It was also a balanced program when analyzed against the nuclear apocalypse analogy. The MIDAS program appeared as if it might prevent a nuclear apocalypse while also maintaining space as a peaceful place for the province of all nations.

<div align="center">AE Framework Analysis</div>

This section briefly analyzes the use of the nuclear apocalypse analogy against Khong's AE framework to determine if, and in what ways, policymakers used it.

Defining the situation for the policymaker

Since science fiction was the only means of public discourse for nuclear weapons from 1940 to 1945, it formed the baseline understanding from which the public and policymakers began framing the nuclear debate. Franklin assesses the nuclear fiction of the 1940s through the 1960s, saying, "the fiction expressed the range of conduct acceptable to the American public and considered permissible by the US government."[73] The nature of the situation was presented as a dichotomy—either allow nuclear weapons in space, all but ensuring a nuclear apocalypse, or designate space as a region of peace. Schacter, in his fictional stories and in his professional life as a UN legal advisor, perpetuated the idea that military spacecraft were inherently more dangerous than other military assets, such as naval vessels. By defining military spacecraft as inherently more

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[71] Ibid., 124.
[72] Weinberger, *The Imagineers of War*, 105.
[73] Franklin, *War Stars*, 87.

destabilizing than military assets in the other domains, the policymakers began to implement policies that promoted peacekeeping military spacecraft, such as reconnaissance and missile warning satellites, rather than offensive space weapons.

Assess the stakes

The dystopian science fiction stories that propagated the nuclear apocalypse analogy laid out in fantastic detail the potential stakes of a nuclear-armed space environment. While the images varied from likely to highly improbable, the variety of fictional futures presented by science fiction vividly described all of the worst-case scenarios. The combination of these nuclear stories with the already present tension of the post-WWII world led policymakers to err on the side of caution, and so they began to temper their military space ambitions.

Provide prescriptions

The dystopian images of a post-nuclear world shaped policy discourse regarding military space in that it demanded a solution that would not plunge America, and the world, into a state of nuclear apocalypse. Science fiction presented space as an area not yet tarnished by humans. The fictional dystopias supposed that any placement of nuclear weapons in space, whether on orbit or on the Moon, was likely to escalate into a disastrous scenario for Earth. According to science fiction, no single country should claim the space domain, lest they place nuclear weapons on orbit, putting every other nation under constant threat. Instead, the US should pursue the utopian vision of a unified international society, led by US ideals and morals. The prescription, then, of science fiction was the utopian alternative, a unified global approach to the space domain, one that would be legislated into existence with the ratification of the OST.

Predicting success

Outside of early warning, the nuclear apocalypse analogy does not appear to have helped or been used by policymakers to predict their chances of success. Science fiction does, however, predict that the chance of failure is high if the US fails to take active steps to unify the world in peace. In that fiction, space is presented as a domain that might help mitigate that failure.

Evaluating moral rightness

While the analogy does not directly evaluate the moral rightness of policymakers, it does influence their value judgments. The analogy infers that space might be a possible means to achieve peace and prevent total nuclear annihilation, whether through a Pax Americana or a united international community. Using the nuclear apocalypse analogy, politicians felt obligated to try to at least mitigate the threat of nuclear apocalypse through space-centric policies, which was ultimately pursued via domestic and international space policies. Richard Hewlett and Jack Holl write in their study of the Atomic Energy Commission that Eisenhower specifically felt "a sense of moral compulsion that drove [him] to seek some redeeming value in a new technology that threatened the future of humanity."[74]

Warning about the dangers of other options

The nuclear apocalypse dilemma is framed dichotomously in that if there is an impending nuclear apocalypse, space is the only refuge of humankind. If policymakers choose poorly, and place nuclear weapons in space, science fiction predicts global calamity. Similarly, if the world can designate outer space as an area free from national claims, where the international community is unified in the idea of space for peaceful purposes, this might actually improve international relations on Earth, unifying the world in a Western-centric, utopian vision.

Conclusion

It is challenging to distill science fiction from other sources of Cold War fear in the nuclear apocalypse analogy. Thus, while science fiction influenced policy, it was just one piece of the broad Cold War anxiety permeating the country. As Franklin puts it, "the threat of nuclear devastation unleashed a host of fantasies already teeming in the American psyche."[75] Science fiction both revealed and encouraged the fear of the nuclear threat. Where science fiction did succeed was in proposing the peaceful use of space as a potential solution to the threat of nuclear apocalypse. Additionally, the presence of

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[74] Richard G. Hewlett et al., eds., *A History of the United States Atomic Energy Commission* (Berkeley: University of California Press, 1989), 239.
[75] Franklin, *War Stars*, 174.

science fiction as the single voice on nuclear weaponry from 1940 to 1945 means it was a prominent and compelling component of American nuclear discourse. Ultimately, the policies put in place by decision makers to quell the fear generated by nuclear weapons and the Cold War were encouraged, but not decided, by science fiction.

The peaceful use of outer space provided a fiscally acceptable reason to pause the militarization of space, just as the civilian side of the space race, the one to the Moon, gained speed and required a more significant percentage of the federal budget. However, the fact remains that military space programs were restricted in a manner that other military domains at the time were not, probably due to the nuclear apocalypse analogy, which presented space as a means to unify international society in peace. In this way, the analogy provided policymakers a convenient and public prescription with which to quell Cold War anxiety.

The policy, though just a small component of broader national changes, worked, slowing the weaponization of space for more than a decade. The DOD's pivot to Intelligence, Surveillance, and Reconnaissance (ISR) satellites has proven strategically invaluable in supporting all elements of national power. Additionally, stepping back from space weaponization provided the financial flexibility the Kennedy administration needed to focus on its peaceful, civilian space pursuits. In 1959, 64% of Americans listed nuclear war as the nation's most urgent problem.[76] Disch writes that "by the early 1970s, study of the treatment of the nuclear arms race in American education journals on the subject were almost totally ignored."[77] A study of student attitudes in 1973 revealed that "the atom bomb is a dead issue."[78] As time passed, the public fear of a nuclear apocalypse faded and the unverifiable, and therefore, unenforceable policy of the OST limits its durability as a lasting utopia. Nevertheless, the fear of a nuclear apocalypse from space was alleviated at the time with the balm of peaceful 'manned' space travel, the prospect of scientific frontier exploration, while early warning satellites provided overwatch for the nation.

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[76] Disch, *The Dreams Our Stuff Is Made Of*, 94.
[77] Ibid., 94.
[78] Ibid., 94.

Chapter 5

Theme of Man in Space

Earth is the cradle of humanity. But one cannot live in the cradle forever.

Konstantin Tsiolkovsky

Sir Edmund Hillary climbed Mount Everest because it was there; in Jules Verne's tale *From the Earth to the Moon* and H.G. Wells' *First Men in the Moon*, the protagonists go to the Moon with the same spirit of adventure.[1] From the outset, space-themed science fiction perpetuated the idea that it is humans, not machines, who must travel to space to be in control of their destiny. The centrality, and morality, of "man" in spaceflight was a dominant theme throughout the science fiction literature of the 1930s-1960s.[2] When the fictional tales feature machines or robots as a central element, they are often dystopias, where a human must intervene to provide moral reasoning and decision making instead of the logical, unfeeling machines. The theme of man as the central figure in space permeates society and policymakers so completely that McCurdy writes, "The space age began with the collective presumption that humans would carry out practically all activities in space, from maintenance to exploration."[3]

Unlike other science fiction narratives, policymakers and scientists did not uniformly assimilate this science fiction theme into their collective understanding of space exploration. Scientists argued that sending humans into space provided little technical benefit. Soviet rocket scientist Sergei Korolev famously referred to cosmonauts as 'rabbits' since they were merely the subject in the Soviet spaceflight experiments and had a marginal role in controlling the vehicles.[4] Likewise, Mercury astronauts were called "Spam in a can" for similar reasons: they were just passengers on an automated satellite. By 1961, the permeation of science fiction into the general population made it

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[1] Disch, 67.

[2] Of note, during the time, American fiction was primarily focused on men, not women as the protagonist of most space adventures, which is why the centrality of 'man' and 'manned' spaceflight is investigated. For the most part, any females in American science fiction of the day were sidekicks, lacking any real influence or prowess.

[3] Howard McCurdy, *Space and the American Imagination*, 2nd ed. (Baltimore, MD: Johns Hopkins UP, 2011).

[4] Slava Gerovitch, *Soviet Space Mythologies: Public Images, Private Memories, and the Making of a Cultural Identity* (Pittsburgh, PA: University of Pittsburgh Press, 2015), 139.

seem to the public that human space travel was merely a matter of time.[5] Thus, policymakers focused on using the image of men in space as a tool for political propaganda. The message of US political leadership in the 1950s and 1960s was that man, specifically an American man, must be the hero of space; machines were insufficient to lead America into the future. The cost for this singularly focused policy pursuit was high, resulting in the military's forced divestment from the pursuit of crewed missions, while NASA continued with crewed missions.

Social Influence and Perspectives

In the post-WWII nuclear age, there was a general anxiety about the loss of human agency to technology. To combat the anxiety and "to sell Americans on the notion of progress through technology," McCurdy writes that, "advocates extolled the concept of human mastery." If human mastery over technology is the utopian dream of American society, then robotic domination is science fiction's dystopian counter. Science fiction introduced dystopian stories of artificially intelligent robots subverting humanity and achieving world domination. Space, a domain dependent on technology for even the smallest excursion, found itself beholden to the idea that humans must always be present in space in order to guide, and impose, human morality on the functioning of that technology

The first use of the term robot is traceable back to a Czech science fiction writer Karel Kapek. Kapek's 1921 tale turned play, *RUR: Rossums Universal Robots*, turned the Czech word for serf labor, robota, into the now universally recognized term for a mechanical laborer, robot.[6] Kapek's robots did human jobs that humans preferred not to perform.[7] In the dystopian play, the mechanical servants eventually become self-aware, rebel against their humans, and ultimately achieve world domination as a new race of mechanical overlords.[8] Isaac Asimov's 1940s short stories "Robbie" (1940), and "Runaround" (1942) popularized the theme of robots and set the stage for Asimov's widely read series of robot tales published in the 1950s. These stories also made the jump

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[5] Ralph Lapp, *Man and Space: The Next Decade* (New York: Harper & Brothers, 1961), 7.
[6] Paul J. Springer, *Military Robots and Drones: A Reference Handbook*, Contemporary World Issues (Santa Barbara, CA: ABC-CLIO, 2013), 10.
[7] Ira Flatow, "Science Diction: The Origin Of The Word 'Robot,'" NPR Talk of the Nation, accessed March 2, 2020, https://www.npr.org/2011/04/22/135634400/science-diction-the-origin-of-the-word-robot.
[8] Springer, *Military Robots and Drones*, 10.

into film including 1968's *2001: A Space Odyssey*. Written by Stanley Kubrick and Arthur C. Clarke, the artificially intelligent computer, HAL-9000, is responsible for controlling a crewed expedition into the solar system. HAL's logic and subsequent decision making threatens the astronauts' lives while they are out on their mission, illustrating the danger of placing machines in charge of space exploration.

Machines of the 1950s and 1960s were nowhere near the artificially intelligent robots portrayed by Asimov and Clarke, yet there was still a widespread aversion to robots performing what many viewed as inherently human endeavors. The aversion to machine centric operations, according to Steve Woolgar, a renowned sociologist, is because the potential rise of robotics in space exploration perpetuates a controversy over the "uniqueness of mankind."[9] Science fiction narratives played on the public's conception of self and the impression that human moral reasoning cannot be replicated by a machine. Science fiction perpetuated the idea that if space exploration were to be accomplished primarily by robotic machines and not humans, then the fundamental "notions about the character of man are at stake."[10] Science fiction did not create these human insecurities; rather, it amplified them through the concept of humanoid machine servants called robots that could accomplish the same tasks equally well, or better, than a human. While there was no serious discussion of creating humanoid robots during the 1950s and 1960s, there was serious consideration given to leveraging autonomous or remotely operated machines to conduct space missions. While the theme of artificially intelligent robots was prevalent and influential in the 1940s and 1950s, at the same time, another, more utopian vision of man as the hero of space exploration emerged.

The utopian vision of man as the central arbiter of spaceflight was popular in numerous hard and soft science fiction tales, from outlandish tales such as Buck Rogers to the rooted-in-science tales of von Braun and Clarke. Von Braun was a staunch proponent of man in space, perpetuating his views both through his official position as an engineer as well as through the popular cultural mechanism of science fiction. His utopian *Across the Space Frontier* places humans front and center. His rockets include a

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[9] Steve Woolgar, "Reconstructing Man and Machine: A Note on Sociological Critiques of Cognitivism," in *The Social Construction of Technological Systems*, ed. Wiebe Bijker, Thomas Hughes, and Trevor Pinch (Cambridge, MA: MIT Press, 2012), 304.
[10] Ibid., 305.

third stage crew cabin, which was meant to return to Earth after each mission with its crew aboard.[11] Additionally, von Braun's imaginary future space crews were responsible for the construction of a space station, developing first an in-space scaffolding system and then constructing their habitats.[12] Von Braun acknowledges, however, that human movement is likely to interfere with the operations of his imagined space observatory telescope. His solution to prevent human interference on the telescope is not to station humans on Earth, but have them reside on an adjacent space station in order to control the observatory. Arthur C. Clarke presents a similar vision as his space-based global communications network features an on-site human crew to operate and service the communication satellites.[13]

In March of 1952, *Collier's*, a national weekly magazine, presented an eight-part series about men in space. The first issue in the series was titled "Man Will Conquer Space Soon" and featured various imaginary futures for humans living and working in space.[14] Von Braun, Willy Ley, and other *Across the Space Frontier* contributors also used the *Collier's* series to promote the idea that it was man, not a machine, who would conquer space. In addition to *Collier's*, von Braun took his appeal about the centrality of manned spaceflight to Walt Disney. In 1955, millions of viewers tuned in to watch Disney's "Man in Space," proliferating the idea that it was humans, not machines who must explore the frontier and conquer all aspects of space.[15] Von Braun also worked to convince policymakers directly, saying to Project Mercury officials "man is still the best computer that we can put aboard a spacecraft."[16] The space visions perpetuated by von Braun, Clarke, and others throughout the pulp era consistently showed that the ultimate space utopia placed humans as the central figures of exploration, making it difficult to imagine a positive machine-led space exploration.

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[11] Kaplan et al., *Across the Space Frontier*, 27.

[12] Ibid., 37.

[13] McCurdy, *Space and the American Imagination*, 236.

[14] McCurdy, *Space and the American Imagination*, 45.

[15] Ibid., 47.

[16] Douglas Brinkley, *American Moonshot: John F. Kennedy and the Great Space Race* (New York, NY: Harper, 2019), 185.

McCurdy writes that the prevalence of human-centric space exploration in popular culture made it so "spaceflight could not survive within political circles unless it emphasized human spaceflight."[17] The pervasiveness of science fiction about the dystopian world of robots and the utopian dream of man as the space hero were compelling narratives in the early days of the military space program. These narratives combined with Cold War anxiety regarding the loss of human agency to technology was a key theme capitalized on by science fiction stories. Therefore, the political rhetoric regarding space aimed to alleviate fear and demonstrate that humans were still in charge of technology, especially in the new endeavor of space.

Influence on Policymakers

The idea that man was required for the exploration of space was a crucial component of the earliest iterations of national space policy. As early as December 1957, the National Scientific Advisory Board emphasized getting men into space at the earliest time.[18] A June 1958 statement regarding the space policy prepared for President Eisenhower by his National Security Council proclaimed that "To the layman, manned exploration will represent the true conquest of outer space. No unmanned experiment can substitute for manned exploration in its psychological effect on the peoples of the world."[19] Eisenhower, though wary of the military-industrial complex, conceded that both crewed and robotic space exploration were important components of the national space program, but insisted that "a great part of the unmanned program for the scientific exploration of space is a necessary prerequisite to manned flight."[20] Subsequently in 1958, NASA began development on the Mercury program, flying its first manned mission in 1961. The military followed suit and began to pursue crewed military space missions at the same time as NASA, though not as swiftly. The DOD's manned space programs included the Air Force's Dynamic Soaring (DynaSoar) program, the X-15

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[17] McCurdy, *Space and the American Imagination*, 55.
[18] David N. Spires, *Beyond Horizons: A Half-Century of Space Leadership*, 6th ed. (Maxwell AFB, AL: Air University Press, 1998), 56.
[19] John Logsdon, "The Costs of Human Spaceflight Are High. History Shows the Benefits Are Too," *Time*, September 11, 2018, https://time.com/5390662/human-spaceflight-history/.
[20] McCurdy, *Space and the American Imagination*, 243.

hypersonic test vehicle which is not investigated in the scope of this paper, and the Army's previously discussed investigation into lunar bases under Project Horizon.

Pursuit of human spaceflight quickly became the central focus of the early space race. In April 1961, the Soviet Union successfully launched Yuri Gagarin into space, beating the US yet again in space feats. America matched the Soviet's accomplishment shortly thereafter when Alan Shepard made a suborbital launch in his Mercury spacecraft on 5 May 1961. Later that month, the National Security Council recommended to President Kennedy that he set a manned lunar landing as a national goal, suggesting that "it is man, not merely machines, in space that captures the imagination of the world."[21] Kennedy and Johnson wanted to pursue a space plan that would be considered dramatic while still providing a positive image of America in the eyes of the international community.[22] Manned spaceflight provided Kennedy an opportunity to display to the international community American values, norms, and technological superiority on an international stage. Lloyd Berkner, chair of the National Space Science Board, helped to convince Kennedy that "scientific exploration of the moon and planets should be clearly stated as the ultimate objective of the US space program for the foreseeable future."[23] Berkner was an avid proponent of science fiction visions of human-centric interplanetary travel, often invoking fictional storylines and themes of man's "high adventure" in space. He claimed that a significant manned spaceflight program would be "potentially the greatest inspirational venture of the century" that would influence not only Americans but the world.[24]

While politicians pushed for humans to be the central element of space travel, many in the scientific community opposed such policies. James Van Allen, a physicist who helped design the instrumentation for early US satellites, was fervently against crewed spaceflight. Van Allen went so far as to call human spaceflight a "costly nuisance" that had been "elevated in some quarters to the quasi-religious belief that space

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[21] Logsdon, "The Costs of Human Spaceflight Are High. History Shows the Benefits Are Too."

[22] John M. Logsdon, ed., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program,* The NASA History Series, NASA SP-4407 (Washington, DC: National Aeronautics and Space Administration, 1995), 423-8.

[23] Walter McDougall, *The Heavens and the Earth: A Political History of the Space Age*, Johns Hopkins Paperbacks edition (Baltimore, MD: John Hopkins UP, 1997), 315.

[24] Ibid.d, 315.

is a natural habitat of human beings."[25] In this case, scientists and policymakers were not influenced evenly by the utopian dream of man as the key to space dominance. Scientists looked at the problem set logically, understanding that it would be far easier and less costly to explore the frontier of space and work together peacefully if they could perform their missions autonomously, without the requirement to sustain human life. Van Allen pointedly told politicians and the public that, "the only surviving motivation for continuing human spaceflight is the ideology of adventure," arguing that the fixation on human space travel fiscally and technically hampered the development of space systems.[26]

The focus on humans as a central participant in spaceflight was influenced by both science fiction stories and future scenarios described by scientists like von Braun. However, it was further invigorated by the fact that the Soviet Union was ahead of the US in human spaceflight and, therefore, the technology that enabled it.[27] NASA used science fiction and the idea of manned spaceflight as a public relations campaign in order to garner popular support for budget negotiations.[28] Unfortunately, the military space program was largely left out of this public relations campaign, which was a harbinger for the future of crewed military space missions. Nonetheless, the military's Blue Gemini program, which transitioned into the Manned Orbital Laboratory (MOL), was initiated under Kennedy's manned spaceflight initiative.[29]

Military Influence

Before the official focus on manned spaceflight, the DOD began formally promoting manned spaceflight in 1958. Capitalizing on the DOD's advocacy, the Air Force began to develop its own military space program predicated on deep human involvement.[30] In April 1958, the Air Force published report titled "Air Force Manned Military Systems Program."[31] The report laid out a four-stage plan for Air Force human-

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[25] McCurdy, *Space and the American Imagination*, 238.

[26] Roger D. Launius and Howard E. McCurdy, *Robots in Space: Technology, Evolution, and Interplanetary Travel*, New Series in NASA History (Baltimore: Johns Hopkins UP, 2008), 2.

[27] Spires, *Beyond Horizons*, 102.

[28] Disch, *The Dreams Our Stuff Is Made Of*, 175.

[29] Mark Erickson, *Into the Unknown Together: The DOD, NASA, and Early Spaceflight* (Maxwell Air Force Base, Ala: Air University Press, 2005), 463–64.

[30] Spires, *Beyond Horizons*, 56.

[31] Erickson, *Into the Unknown Together*, 151.

spaceflight that included multi-week crewed orbital flights, as well as a lunar landing.[32] Roger Launius and Howard McCurdy write that "nearly every military use of space, from reconnaissance platforms to missile stations on the Moon, was thought to need human operators at the site."[33] These programs included the Air Force's DynaSoar orbital glider program, the Army's lunar basing program, the X-15 manned hypersonic program, and the WS-117L satellite system, which initially had a manned strategic component for weapons development and reconnaissance.[34] In 1961, the Air Force published its first formal space plan which called for an "aggressive military space program." The plan also declared that it was "imperative for the United States to determine the military utility of man-in-space at the earliest possible time."[35] The plan suggested that command and control, ISR, and in-space maintenance and repair functions would be better if accomplished by a human in space, rather than autonomously controlled from Earth.[36]

In the early days of the US Air Force's foray into space, the service recruited and developed fourteen personnel for their astronaut corps.[37] Spires writes that "despite the promise of major advances by unmanned, artificial earth satellites in support of operational requirements, man-in-space remained the centerpiece of Air Force efforts during the 1960s."[38] The primary reason for this focus is that it was good press: humans want to see other humans, not machines, achieving greatness and beating the Soviets. The secondary reason is that the Air Force tried to institutionalize space into their "traditional airplane-oriented" service, which centered around the direct human control of their military machines.[39] The Air Force and DOD's single-minded focus was, in some part, based on the central premise that it was humans, not robots, that would usher Earth into the next technological era of space travel.

The DynaSoar program was initiated as a concept in 1957 and, by 1959, a contract was awarded to Boeing for a three-stage development program.[40] As originally

[32] Ibid., 151.
[33] Launius and McCurdy, *Robots in Space*, 6.
[34] Spires, *Beyond Horizons*, 56, 285.
[35] Ibid., 103–4.
[36] Ibid., 104.
[37] McCurdy, *Space and the American Imagination*, 237.
[38] Spires, *Beyond Horizons*, 96.
[39] Ibid., 96.
[40] "X-20 DynaSoar," *NASA* (blog), July 30, 2015, https://crgis.ndc.nasa.gov/historic/X-20_Dyna-Soar.

envisioned, DynaSoar was to be both a reconnaissance platform and an orbital bombing platform.[41] The first stage included the development of a hypersonic test vehicle that would eventually be capable of flying humans in space and through the air.[42] However, the program was prohibitively expensive, with a $58 million budget request in fiscal year 1961 and another $106 million request the following year.[43] The requirement for DynaSoar to carry a human crew to perform its mission significantly cut down on the space available for ISR and bombing payloads. DynaSoar was the first casualty in the military's manned space program, partly because of its cost, but also because its orbital bombing mission was at odds with the prevailing notion of space for peaceful purposes, discussed in the previous chapter.

The WS-117L program is often remembered as a remotely operated satellite system. However, initial plans for the WS-117L satellite system had a manned reconnaissance and weapons platform, reminiscent of Clarke and von Braun's utopias.[44] However, with the initiation of the Air Force's MOL program and as more funding was shifted into civilian manned spaceflight, the plans for a manned platform aboard the WS-117L satellite system was transitioned to the MOL effort. The WS-117L developed into a variety of unmanned ISR systems including the missile warning system MIDAS and a remote optical and signals surveillance satellite system called SAMOS (Satellite and Missile Observation System). General Schriever lobbied for a manned version of the SAMOS satellite, saying, "There are many activities for which a human flyer is better fitted than the most sensitive instrument."[45] Military leadership believed that one of the most significant advantages of a human crew on-board ISR satellites was that they could "exercise judgment and discretion in the selection of ground areas to be scanned."[46] Eventually, fiscal and technical realities prevailed and the SAMOS and MIDAS systems remained unmanned ISR platforms.

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[41] Curtis Peebles, *High Frontier: The U.S. Air Force and the Military Space Program* (Washington, DC: Air Force History and Museums Program, 1997).
[42] Ibid., 16.
[43] Spires, *Beyond Horizons*, 290.
[44] Spires, *Beyond Horizons,* 285.
[45] Lapp, *Man and Space*, 116.
[46] Ibid., 116.

The Air Force routinely lobbied the DOD to provide enough funding to sustain the man in space role of the military, but was met with ambivalence.[47] Although President Johnson would later defund the programs, early in his presidency he directed that the DOD support manned military spaceflight, including the development of a crewed military research laboratory in space.[48] The MOL was designed as a space-based, crewed, orbiting reconnaissance station.[49] The station was imagined as a subsequent iteration of the Blue Gemini program, which was essentially a Gemini capsule on top of a large aperture telescope for use as a reconnaissance asset.[50] The ideas fueling MOL were paragons of science fiction: conceptual drawings of the military station looked like those in *Collier's* and *Across the Space Frontier,* promoting the fictional images to which Americans were accustomed. The MOL would be the "ultimate high ground, where military campaigns would be fought and won or lost."[51] Ultimately, the MOL program was canceled in June of 1969, as manned spaceflight budgets shifted from the military to NASA and unmanned systems were proving useful without a human crew on-board. [52]

The utility of crewed military spaceflight was never proven since crewed missions were canceled by the end of the decade and never restarted. Crewed spaceflight was expensive and sustaining both the NASA and DOD manned spaceflight programs was infeasible, especially in light of other strains on the national budget such as Johnson's Great Society and the Vietnam War. Though the decline of the missions began under Kennedy and Johnson, the Nixon administration officially ended all standalone manned military space missions as a way to divert more DOD funding into Vietnam, and military crews were relegated to only working with NASA for crewed spaceflight missions.[53] While the Air Force resented this development, in retrospect, it proved fortuitous, pushing the Air Force to focus on improving its mission effectiveness without having to design cumbersome and costly human support components to each spacecraft. Regarding

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[47] Spires, *Beyond Horizons*, 97.
[48] Ibid., 97.
[49] McCurdy, *Space and the American Imagination*, 237.
[50] Elizabeth Howell, "Manned Orbiting Laboratory Declassified: Inside a US Military Space Station," *Space.com*, March 4, 2017, https://www.space.com/34661-manned-orbiting-laboratory-declassified-photos.html.
[51] McCurdy, *Space and the American Imagination*, 185.
[52] Howell, "Manned Orbiting Laboratory Declassified: Inside a US Military Space Station."
[53] Spires, *Beyond Horizons*, 132.

NASA's human spaceflight programs, even NASA faltered after the Apollo missions, with many contending that "NASA's fixation on man in space," was actually the "curse of the space program."[54] Oliver Morton writes that "Apollo quickly became, at best, irrelevant. It had done nothing to clean the world, or feed the world, or take burdens from the shoulders of the world or make the world more equal. Everything was the same."[55] Disch agrees, saying, "Astronauts were dull...Once we had put some footprints on it [the Moon], planted the flag in its best, and taken some souvenirs snapshots, additional Moon trips did not excite much tension."[56]

Instead, the Nixon administration directed the Air Force to develop cost-effective space programs in an era where crewed spaceflight was not fiscally viable. The Air Force wasted much of the late 1950s and early-1960s pursuing manned space programs that were fiscally irresponsible and not as effective as their autonomous counterparts would have been. The Air Force, with its pilot-centric mindset, envisioned space as portrayed in science fiction, a place where men would be present within the domain to heroically fight and win our nation's wars. The Air Force refocused on remotely operated missions supporting national defense, subsequently building the exquisite national space-based ISR, missile warning, communications, and navigations architecture that remains today.

Analysis

This section briefly analyzes the use of the theme of man as the central figure in space to determine if and in what ways policymakers used the narrative to generate policy. Since the man in space theme is not an analogy, Khong's AE Framework does not provide as complete an analysis, but it still assists in understanding how policymakers used the theme to develop and analyze alternate policy choices. Given this, not all elements of the framework can be addressed. For instance, since man in space is a theme and not an analogy, we cannot assess the potential stakes of the policy choice though we can assess its influence on policy choice. Similarly, the lack of a consistent narrative outside of the prescription that man must be in space to control it does not aid policymakers in predicting their chances of success, if they adopt a policy of human

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[54] McCurdy, *Space and the American Imagination*, 238.
[55] Morton, *The Moon*, 130.
[56] Disch, *The Dreams Our Stuff Is Made Of*, 74.

spaceflight. Policymakers used fictional tales to ponder how space technology might impact human agency, in both a psychological (moral) and physical sense. Using the question of technology versus man and science fiction's dystopian portrayals of robot domination, policymakers grappled with how to develop a national space program. As a result, initial US military space policy focused primarily on manned spaceflight.

Defining the situation for the policymaker

Science fiction helped provide a cultural foundation for the role of technology in space travel, promoting the idea that humans would be in control of all technology related to space-based activities.[57] Additionally, the dystopian science fiction stories portrayed artificially intelligent robots and suggested that human agency might be lost forever if robots are left to explore space without a crew. Science fiction set up a false choice between human and robotic spaceflight, making policymakers choose between man in space or machines in control of operations. There was another rarely considered option, advocated for by scientists but eschewed by policymakers, of humans on Earth controlling satellites remotely, one that would finally be accepted by the military in the late 1960s. Science fiction helped to perpetuate policy built on the underlying supposition that if humans were not in space, then they were not involved in the mission, a stigma that still persists in NASA.

Provide prescriptions

Science fiction set the expectation that humans were central to spaceflight. The prescription was so ingrained in the psyche of policymakers that it was nearly unimaginable to have a space mission without a planned human component. Science fiction's prescription to place humans in the space environment was eschewed by many scientists, yet policymakers persisted, partially because, unlike robots, humans have moral reasoning, which makes them superior. So even if robots are or could become more physically capable, humans must always retain control over space exploration.[58] The policy hinged on whether man was superior both physically and morally. In the physical sense, von Braun's and Clarke's ideas impressed upon policymakers that humans were

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[57] Launius and McCurdy, *Robots in Space*, 5.
[58] McCurdy, *Space and the American Imagination*, 252.

better computers and also able to problem solve and fix any issues in space, better than a machine.[59] In the psychological sense, Asimov and Clarke's tales of artificially intelligent robots illustrated the inability for a machine to conduct moral reasoning. Science fiction was not the sole reason for military space policy prescriptions requiring a human in the domain; it was also good publicity to ensure the Russians, who were already ahead of the US in manned spaceflight, did not "win" that aspect of the space race. The man-centric policy articulated by the Eisenhower, Kennedy, and Johnson administrations, though rebuffed by scientists, was strongly influenced by a cultural narrative of a man as the central arbiter of spaceflight, as portrayed in science fiction.

Evaluating moral rightness

As briefly mentioned above, science fiction perpetuates the idea that humans alone can make moral choices; thus, humans must remain central to the exploration of space. While there is an element of truth to this proposition, science fiction takes it a step further, requiring humans to be present in space to perform any moral reasoning and general decision making. This reasoning is seen throughout DOD and national-level space program guidance and used explicitly by General Schriever to persuade Congress to fund manned military ISR assets.

Warning about the dangers of other options

The dystopian vision portrayed by science fiction showed that if humans were not in space, then robots might take over all reasoning and decision making, shown in stories like *2001: A Space Odyssey*. Similar to the justification in the moral reasoning section, many policymakers tried to preserve human spaceflight by arguing that humans could not simply control spacecraft from the ground. They argued that humans must be present in space to provide immediate and flexible decision making on how space missions proceeded.

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[59] Brinkley, *American Moonshot*, 185.

Conclusion

The debate regarding human spaceflight is ongoing. As recently as 2014, an official study completed by the National Academies of Science and Engineering concluded that "No defensible calculation of tangible, quantifiable benefits…spinoff technologies, the attraction of talent to scientific careers, scientific knowledge, and so on…is likely ever to demonstrate a positive return on the massive investment required by human spaceflight."[60] The report continues, "Americans have continued to fly into space not so much because the public strongly wants it to be so but because the counterfactual, space exploration dominated by the vehicles and astronauts of other nations, seems unthinkable."[61]

John Logsdon, a former member of NASA's Advisory Council writes that "the primary justification for sending humans into space was exploration and "expansion of the realm of human experience," thus "human presence, and its attendant risk, turns a spaceflight into a story that is compelling to large numbers of people. Exploration also has a moral dimension because it is, in effect, a cultural conversation on the nature and meaning of human life."[62] Therefore the focus on humans as the central arbiter of spaceflight has ties to both the theme of man in space and to the frontier analogy. The quest for the frontier is a human experience, and human curiosity is unlikely to be satisfied by sending machines in our stead. Humans must control their destiny, and according to science fiction, space travel is a part of that destiny.

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[60] Logsdon, "The Costs of Human Spaceflight Are High. History Shows the Benefits Are Too."
[61] Logsdon, "The Costs of Human Spaceflight Are High. History Shows the Benefits Are Too.".
[62] Ibid.

Chapter 6

Closing Thoughts

Individual science fiction stories may seem as trivial as ever to the blinder critics and philosophers of today—but the core of science fiction, its essence, the concept around which it revolves, has become crucial to our salvation if we are to be saved at all.

Isaac Asimov

Science fiction of the pulp era (1940s-1960s) helped create America's vision and understanding of the space environment and influenced the development of early military space policy. The recent American revitalization in space means it is essential to remember the influences driving historical space policy development. Many of the science fiction motifs used to create the foundation of military space policy are unsuitable for the current cultural context and state of technology. However, science fiction still frames much of the space environment, exerting an influence on society, scientists, engineers, and civilian space leaders like Elon Musk and Jeff Bezos. Therefore, policymakers are also inherently influenced by science fiction whether they are aware of it or not. Bruce Franklin, a professor of American culture and literature, says of science fiction's influence: "To create the objects that menace our existence, some people first had to imagine them. Then to build these weapons, a much larger number of people had to imagine consequent scenarios - a resulting future- that seemed desirable. Thus, our actual superweapons originated in their imagined history, which forms a crucial part of our culture."[1]

In the early period of military space policy development, science fiction often helped the public, scientists, and policymakers understand the space domain from the same frame of reference. In some cases, science fiction helped scientists persuade policymakers that a particular policy could be achieved.[2] In others, science fiction stories provided policymakers with preformatted rhetoric to use in speeches and declarations. In doing so, science fiction had both positive and negative influences on American culture

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[1] H. Bruce Franklin, *War Stars: The Superweapon and the American Imagination* (Amherst: University of Massachusetts Press, 2008), 4–5.

[2] Walter McDougall, *The Heavens and the Earth: A Political History of the Space Age* (Baltimore, MD: John Hopkins UP, 1997), 314.

and policy. In one sense, science fiction presents a future vision of a utopian space environment, based on post-WWII American ideals.[3] However, these utopian images of space often led to ambitious military space policies that allowed for the expansion of technology and capabilities into space. While these might have led to high hopes that were ultimately dashed, the themes of the peaceful use of outer space and man as the central figure in space exploration also bounded military policy artificially based on the imaginings of science fiction authors.

During the years in which American military space policy was under development, the nation was entrenched in the Cold War; the launch of *Sputnik* indelibly tied military space efforts to it. Because of the close ties between space policy and the Cold War, it is often difficult to parse the influence of science fiction from broader societal fears percolating about the Cold War. Science fiction capitalized on the relationship between space exploration and the Cold War by embedding consideration of prevalent Cold War fears into stories and motifs. The tendency for imaginary war stories to assimilate the context of the time is not unique to the Cold War. In 1871, Chesney's *Battle of Dorking* integrated the societal context into his fictional tale of future war to make it seem more realistic, and thus, more impactful. I.F. Clarke, in his book *Voices Prophesying War* writes that the *Battle of Dorking*, "helped to launch a new type of purposive fiction in which the whole aim was either to terrify the reader by a clear and merciless demonstration of the consequences to be expected from a country's shortcomings or to prove the rightness of national policy by describing the course of a victorious war in the near future."[4] Science fiction takes the fears of the moment and overlays them with future technology to allow an investigation of how the social and political environment will manifest under different emerging technological conditions.

AE Framework Results

Did science fiction make a difference in the early development of military space policy? The answer is, to an extent, yes. Among the three science fiction motifs analyzed, it is apparent that science fiction was used by policymakers to understand the domain and, on a lesser scale, to help evaluate policy alternatives. Science fiction's most

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[3] Ibid., 71.
[4] I.F. Clarke, *Voices Prophesying War: 1763-1984* (London: Oxford UP, 1966), 38.

significant impact on military space policy was in its creation of a shared understanding of the environment and its creation of a common lexicon that policymakers and society at large used to understand and converse about the new domain.

Defining the situation for the policymaker

Policymakers almost universally leveraged science fiction to define the nature of the space domain. The most prevalent of these was the idea that space is the next frontier, an idea that still permeates policy documents today. Using the frontier as a frame provides a particular lens when assessing space policy. While it was useful in many cases and helped promote the idea of military control of space in order to preserve the domain for use by all nations, the analogy also limited policy in some ways. The frontier analogy created a domain so ubiquitous and far reaching without defining intermediary boundaries or operating areas. This meant it was difficult for policymakers to view certain regions of space, such as near-Earth, cis-lunar, or the asteroid belts as their own entities. As a result, the space domain was subject to a one-size-fits-all policy approach that used Earth-bound ideas of frontier and indiscriminately applied it to every diverse region of space. Additionally, the nuclear apocalypse motif promoted the idea of space for peaceful purposes. While space for peaceful purposes was beneficial during the Cold War, as the context of the space domain changed with more countries and corporations entering space, much of the international community remains locked into this frame. The perpetuation of space for peaceful purposes frame may have less saliency today as Russia and China continue to develop threatening space technology, yet it appears that there is no currently acceptable alternate frame to substitute for the international commitment to space for peaceful purposes.

Science fiction provided the lexicon and technical frame from which policymakers defined the problem and communicated their vision. Even the terms we use to describe actions in space—spaceship, spacemen, blast off, and even robot—contribute to this common understanding. In some cases, the frame used by policymakers was limited by science fiction, inducing limits to policy that were more fictional than real. Since science fiction uses utopian ideals in contrast with dystopian visions as a method of storytelling, it can inadvertently set up a false dichotomy in a policymaker's logic. The false dichotomy limits the frame that policymakers use to guide decision making. An

example of the limiting effect of science fiction is seen by the attachment to the concept of man in space. Almost every space system was required to plan for human spaceflight to prevent the loss of human agency. This costly and burdensome endeavor was irrational for the military ISR or missile warning mission sets.

Assess the stakes

In general, science fiction stories provided a framework to assess the stakes of a given policy but did not provide precise measures of the stakes. The stakes were often tied to broader societal ills such as communism, nuclear apocalypse, or loss of human agency to machines that are influenced by a variety of factors, not just military space policy. However, the narrative created by science fiction incorporated Cold War fears into the narratives that ultimately influenced space policy decisions. To prevent communism, military space policies were made under the auspices of frontier expansion. To prevent a nuclear apocalypse, military programs had to promote the broader national goals of space for peaceful purposes. Finally, to prevent the loss of human agency to machines, man remained a central planning factor for most military space programs.

Provide prescriptions

All three science fiction motifs provided prescriptions for policymakers to follow. In most cases, policymakers implemented military space policy that was in-line, though not identical, with the guidance provided by science fiction. Assuming that policymakers adopted the technological frame provided by fictional stories as argued above, the adoption of prescriptions from science fiction is an expected result. Since the lexicon and frame were shared by policymakers and society alike, there was a generally agreed-upon range of policy decisions society might deem acceptable. Sometimes soft science fiction, like *Buck Rogers*, was used to describe what a decision maker did not want to occur in a policy. In other cases, science fiction policy prescriptions generated military programs, such as the Army's manned lunar base or the Air Force's manned orbital laboratory, both imperative to controlling the new frontier of space. In all three cases analyzed, policymakers stayed inside the boundaries developed by science fiction.

Predicting success

None of the science fiction analogies or themes appeared to have helped policymakers in predicting their chances of success. The inability of a future analogy or

theme to help predict success is one of the significant differences between a historical analogy and a future analogy or theme. Visions of the future can provide frames from which policymakers shape decisions, yet the visions do not help assess the chances of success for a given policy decision. The frames provided by science fiction guide policymakers to think about their decisions regarding the space domain through a different lens than without science fiction. It appears that science fiction stories might lead to policies that appear less likely to fail, but they do not provide a means for policymakers to assess the future success of a given policy choice. While policymakers believe that they are choosing a successful policy, science fiction does not readily provide a way for policymakers to analyze how likely the policy is to succeed because their decisions are still based on future predictions rather than any empirical data.

Evaluating moral rightness

Science fiction stories are mostly stories about human morality. The tales of an imaginary future often leverage new or futuristic technology to investigate its potential impacts on both present and future visions of society. The motifs analyzed all helped policymakers understand how American culture might view the morality of their policy choices. In one instance, machines versus humans, it perpetuated the idea that only humans could make moral choices, while the frontier analogy framed space expansion as a means to combat communism, a moral imperative at the time. In this way, science fiction was helpful, but also potentially limiting, since it created a shared understanding of what decisions were moral.

Warning about the dangers of other options

The frontier analogy did not warn policymakers about the dangers of other policy options. However, the nuclear apocalypse and man in space dilemmas provided policymakers with a possible worst-case scenario of a poor policy choice. The science fiction stories centered around nuclear apocalypse illustrate that the potential outcome of a bad policy might be world ending. Conversely, the theme of man in space falsely prophesied that letting machines explore space would be a slippery slope to social subordination to robots. The false or overblown dangers regarding the potential consequences of other options artificially guided policymakers away from autonomous

vehicles and eventually shuttered the development of nuclear propulsion technology in military space policy.

Implications for the Future

Science fiction is a cheap, readily accessible, and useful device for the investigation and analysis of space policy alternatives. The utopian and dystopian narratives present in science fiction allow policymakers to envision possible futures through various lenses, illuminating a state's conception of their ideal future space environment. The linkages between the popular culture generated by science fiction, political discourse, and technological innovation allow policymakers to creatively investigate a variety of possible futures and provide "a simulation to juxtapose alternative futures."[5] However, policymakers must use caution to ensure that their use of science fiction is not too narrow, lest it artificially constrain their policy. Instead, policymakers must understand the underpinnings of science fiction themes, especially the background of the author and the context for which the imaginary future was written. Just as WWI-era fiction was incompatible with Cold War policy decisions, Cold War-era science fiction is likely less useful than contemporary fiction for modern space policy development. There are however, several sources of contemporary science fiction that policymakers might consider studying.

Star Trek, a long running television show and recent movie series has been referenced several times, mostly in jest, as the US stands up its sixth service, the US Space Force. The 1960s, 1990s, and more contemporary *Star Trek* series and movies tackled contextual societal and political issues. While policymakers may not have considered the newer *Star Trek* episodes in their current policy decisions, with the exception of perhaps borrowing rank structure, patches, and uniform designs, there are other sources substantive contemporary science fiction that policymakers should consider. For example, the projected nine-volume Expanse series, begun with *Leviathan Wakes,* and its corresponding television show *the Expanse*, kept alive by Jeff Bezos, is a study in what the political environment might look like in a future that includes humans living and working in space. It would behoove policymakers to have a familiarity with

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[5] Mark Hamilton, "Poli Sci-Fi 101: Lessons from Science Fiction Television for Global and Outer Space Politics," in *Securing Outer Space* (London: Taylor & Francis, 2009), 206.

the themes and concerns voiced in *Leviathan Wakes* to understand how to shape the political environment of the future. *The Martian* by Andy Weir is another book-to-screen science fiction story that may help policymakers consider international cooperation, communications infrastructure for deep space missions, and in-space rescue services, to start.

Policymakers should not apply any of these fictional stories wholesale to national policy, but take the lessons present in these stories to improve space policy analysis. Science fiction reflects the attitudes and culture of subsets of society when that fiction is written and it is reckless to apply lessons learned in science fiction without consideration of the current contextual environments and broader needs of society. This is not to say that science fiction is not a useful tool for policymaking; it is useful when employed with the understanding that boundaries drawn in a fictional world are not necessarily real-world limitations.

Between the 1940s through the 1950s, science fiction served a broader purpose than pure entertainment: it helped to drive the development of space policy. While mid-20th century science fiction tales limited policies in some regards, they also helped propel the US into the space domain. While *Sputnik* was the significant impetus driving the American space program into action, science fiction provided a pathway to make the US a space-faring nation in short order. It is important to recognize science fiction as a means of policy and technology investigation. Jones and Paris write that science fiction has "profound implications for how we think about political ethics and political possibilities."[6] An increasing number of political scientists and social analysts think that "a familiarity with science fiction can help political scientists broaden the scope of their theories."[7] Science fiction stories can and should help to shape and guide policy, with the acknowledgment that fictional stories cannot be wholly applied to reality.

The US is undergoing a resurgence in its interests in spaceflight. This resurgence is being driven in part by commercial companies, led by the science fiction aficionados Elon Musk and Jeff Bezos. Science fiction is a significant driver behind both Bezos's and

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[6] Calvert W. Jones and Celia Paris, "It's the End of the World and They Know It: How Dystopian Fiction Shapes Political Attitudes," *Perspectives on Politics*, vol. 16, no. 4 (2018): 983.
[7] Hamilton, "Poli Sci-Fi 101," 216.

Musk's spaceflight dreams, so it would behoove policymakers to have a working understanding of the underlying narrative and frame shaping the perspectives of each of these entrepreneurs. Contemporary American and Chinese science fiction might provide policymakers additional insight into the differing societal visions of utopia or dystopia in the future. The contrasting images of utopian ideals in space may help US policymakers analyze various policy alternatives to include whether the goal of preserving space for peaceful purposes is still a viable policy. Science fiction provides an important but undervalued insight into domestic and international societal preferences with regards to space. Science fiction is a useful method for policymakers to explore the future of space and the US must leverage this unique form of literature to its full advantage.

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