"Neutrons? They trigger the atom bomb, don't they?": Nationalism and Masculine Spaces within Science, Technology, Engineering and Mathematics

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Introduction

During a 1949 broadcast of the popular radio program "Adventures in Science," Saul Herbert Sternberg was being interviewed along with other Science Talent Search (STS) contestants in order to explain the relevancy of his work as it pertained to nuclear physics. While trying to explain to the announcer how the nuclear research plates he had used for his experiment interacted with neutrons, the announcer cut him off by saying: "Neutrons? They trigger the atom bomb, don't they?" Despite Stemberg explaining that his project had nothing to do with the atom bomb, the announcer pressed: "All of this leads to what?"[1]

As America progressed into the 1950s the Cold War was beginning to look more like a hot war, most notably with the start of the Korean War. The social anxiety revolving around the ideological conflict with the Soviet Union was increasing. That social anxiety would, for policy-makers and media personalities, escalate into full-bore hysteria when the Soviet Union launched the first orbiting satellite Sputnik I in 1957. In their reaction, the White House, educational organizations, and writers of popular culture aimed their blame at the American education system for the failure of the United States to reach space before the communists. In 1958 these criticisms were codified with the National Defense Education Act (NDEA) and *Life Magazine's* publication of their multi-issue "Crisis in Education" series.[2] These would change science education drastically in the twentieth century. Science education would become a nationalistic enterprise, dominated by the idea that education could help American society catch up and eventually surpass the Soviets in terms of their militaristic and scientific capabilities.

Fast forward to the twenty-first century. *Science Progress* reported in May, 2012 on President Barack Obama's speech at the White House Science Fair on the importance of women in the Science, Technology, Engineering, and Mathematics (STEM) fields. In his speech, the President remarked that, "America belongs at the cutting edge of

[1] "Adventures in Science" script for 19 February 1949, SIA RU 7091, Box 396, Folder 30 in Sevan G. Terzian, "'Adventures in science': casting scientifically talented youth as national resources on American radio, 1942-1958," *Paedagogica Historica* 44, no. 3 (2008), 321.

[2] U.S. House of Representatives, "National Defense Education Act of 1958," (Public Law 85-864), Washington, DC: U.S. Government Printing Office (1958) and "Crisis in Education," *Life Magazine,* March 1958.

innovation…increasing the number of women engaged in…(STEM) fields is critical to our Nation's ability to out-build, out-educate, and out-innovate future competitors."[3] In addition, the Department of Commerce's 2013 *Women in Stem* report found that women make up only twenty-four percent of the STEM workforce.[4] The lack of women in the STEM fields today comes as no surprise following the changes in education as a reaction to the launch of Sputnik if those fields were then focused upon war-making, nationalistic goals. With war-making and nationalism being most associated with masculinity, and with America being a patriarchal society to begin with, one could conclude that these developments would naturally lead to an overwhelming number of men in STEM. However, national policy surrounding science education only partly explains the masculine spaces that developed within the STEM fields.

This paper aims to fill an important gap in the historiography of gender and education around the launch of Sputnik. Two historical strands surround this period without necessarily intersecting: historiography of manhood and the historiography surrounding science education after the launch of Sputnik. While an intersection could be made between the changes in manhood that Susan Faludi, Michael Kimmel, and E.A. Rotundo describe in terms of how American manhood shifted during this time period and the turn toward nationalism in science curriculum, this intersection would be somewhat incomplete. Why is it that the masculine space within STEM solidified during the years following the launch of Sputnik? This masculine space solidified because of the contributions popular culture, which emphasized science and space exploration, that were directed toward boys and young men after the launch of Sputnik.

Historiography

First, the analysis in this paper borrows heavily from the notions of gender as a performative act from Judith Butler's *Gender Trouble: Feminism and the Subversion of Identity*. Drawing upon theorists like Foucault and others, Butler created a new feminist theory which developed the idea that inner conceptions of one's self, in order to be externalized and thus interpreted by society writ large, must be a performative act since the inner conceptions have "no ontological status apart from the various acts which constitute its reality."[5] For Butler, this can be applied to gender; gender itself is a social construct and distinct from biological sex, and thus it has no reality unto itself. The performative nature of gender is important when considering how popular culture affects gender norms. If gender is performative in the ways that individuals embody a gender performance, then popular culture can either be reflective of the prevailing gender performances or display performances that society deems that *should be* performed. This dual frame of reference concerning the interaction between popular

[3] Alexandra Scheeler, "The white house on why we need more women in STEM education," *Science Progress,* May, 2012, Retrieved from: http://scienceprogress.org/2012/05/girls-rock-stem-education-at-the-white-house/.

[4] U.S. Department of Commerce Economics and Statistics Administration, *Women in STEM: A gender gap to innovation,* (ESA Issue Brief 04-11), Washington, DC: U.S. Government Printing Office (2013).

[5] Judith Butler, *Gender Trouble: Feminism and the Subversion of Identity,* New York: Routledge (1999), 173.

culture and gender performativity enhances the theoretical understanding that Butler provided.[6]

Locating the effect of popular culture on the masculine space created within STEM first requires a historical backdrop of American masculinity in the postwar years. American manhood could best be described as an exclusionary practice where men would often define themselves on things they were *not* such as communists or homosexuals.[7] Scholars such as Michael Kimmel and Susan Faludi noted that American men became increasingly concerned about this "gender failure" and the promise that science and space exploration held in terms of a "frontier to be claimed, the promise of a clear and evil enemy to be crushed, the promise of brotherhood in which anonymous members could share a greater institutional glory, and the promise of a family to provide for and protect."[8] American men were searching for a more traditional arena to define their masculinity. The Second World War had provided that for many men who were then fathers during the late 1950s, but most longed for another frontier for their sons to claim.[9] These anxieties were reflected in a new burgeoning field of popular culture: film.

The immediate decade after the Second World War saw a "return to the patriarch" in Hollywood, as Stella Bruzzi described.[10] During this era, certain masculine archetypes emerge in Hollywood that provide examples of masculine archetypes literally being performed on the big screen. War movies in particular offered anxious fathers a nostalgic view of masculine performances. Such movies that premiered during the postwar period included masculine typologies and characteristics such as "the all-male group," "military service and self-improvement," "buddies," and "male friendship, mature masculinity, and patriarchal continuity."[11] The popular culture aimed toward younger men and boys did not directly reflect these nostalgic gender performances in film, but what this does show was that the anxieties that men were feeling regarding their masculinity was being reflected in popular culture. The conflict that was brewing between the United States and the Soviet Union was that of ideology, and that ideology was being reflected in popular culture and aided in the creation of masculine spaces in certain sectors like STEM. However, these histories on masculinity during the postwar period hesitate to intersect with education.

The historiography of science education surrounding the launch of Sputnik by the Soviet Union is largely focused on policy changes that occurred after 1957. This is not to say that these changes were not significant, for they would alter education in America

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[6] Butler, *Gender Trouble,* 173-174.

[7] Michael Kimmel, *Manhood in America: A Cultural History,* New York: The Free Press, (1996) and E. Anthony Rotundo, *American Manhood: Transformations in Masculinity from the Revolution to the Modern Era,* New York: BasicBooks (1993), 289.

[8] Kimmel, *Manhood in America,* p. 156 and Susan Faludi, *Stiffed: The Betrayal of the American Man,* New York: HarperCollins Publishers Inc (1999), 23.

[9] Kimmel, *Manhood in America,* and Susan Faludi, *Stiffed.*

[10] Stella Bruzzi, *Bringing Up Daddy: Fatherhood and Masculinity in Post-War Hollywood,* London: British Film Institute (2005), 40-70.

[11] Mike Chopra-Gant, *Hollywood Genres and Postwar America: Masculinity, Family and Nation in Popular Movies and Film Noir,* New York: I.B. Tauris & Co Ltd (2006), 122-139.

for the rest of the twentieth century. education policy in the years after Sputnik could be identified by two distinct elements: the federal government taking an unprecedented role in determining national education priorities and "the growing fear that the United States was losing its political and technological standing in the world."[12] The federal government's role in science education led to an increase in standardization in the science curriculum.[13] The different roles that boys and girls would have in the new science curriculum, which was already being formulated in the years leading up to the launch of Sputnik, became solidified during this moment of standardization and anxiety concerning the global standing of United States' science education.

In the decades prior to the launch of Sputnik, science was already becoming a more masculine schooling endeavor. Sevan Terzian described how, during the emergence of science clubs in the 1930s and 1940s, "gender differences manifested themselves in the occupational and social realms" that led to differences in "science pedagogy."[14] For instance, girls were more likely to be taught science based on "domestic applications" rather than boys.[15] Then, when science clubs became more closely involved with private companies, consumerist assumptions on the practicality of science for girls and boys started to shape the educational opportunities available to girls.[16] These assumptions would carry into the postwar era.

Marilyn Holt described in *Cold War Kids: Politics and Childhood in Postwar America, 1945-1960* that children were being thrust into the ideological conflict with the Soviets through their educational experiences. Holt documented a Gallup poll in the waning months of 1957 that seventy percent of those surveyed "believed that it was up to the students to compete with their Soviet counterparts."[17] The militarized masculinity that coalesced during the Cold War began to be projected onto children. According to Holt, children "were the country's next generation of military and citizen soldiers. On their shoulders rested preservation of the country's ideals and way of life."[18]

The historiographies of American masculinity in the postwar era and of science education following the launch of Sputnik leave possibilities for existing convergences but ultimately give an incomplete picture of the events that created the masculine space within the STEM fields. The superficial explanation would be that the militarization of

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[12] Kathleen Steeves, Philip Bernhardt, James Burns, and Michele Lombard, "Transforming American Educational Identity After Sputnik," *American Educational History Journal* 36, no. 1 (2009), 73.

[13] Andrew Hartman, *Education and the Cold War: The Battle for American Schools,* New York: Palgrave MacMillan (2008), 55; Peter Dow, *Schoolhouse Politics: Lessons from the Sputnik Era,* Cambridge: Harvard University Press (1991); Steeves, Bernhardt, Burns, and Lombard, "Transforming American Education After Sputnik;" Cathy Wissehr, Lloyd Barrow, and Jim Concannon, "Looking Back at the Sputnik Era and Its Impact on Science Education," *School Science and Mathematics* 111, no. 7 (2011).

[14] Sevan G. Terzian, *Science Education and Citizenship: Fairs, Clubs, and Talent Searches for American Youth, 1918-1958,* New York: Palgrave Macmillan (2013), 49.

[15] Terzian, *Science Education and Citizenship,* 49.

[16] Terzian, *Science Education and Citizenship,* 57-79.

[17] Marilyn Holt, *Cold War Kids: Politics and Childhood in Postwar America, 1945-1960,* Lawrence: University Press of Kansas (2014), 76.

[18] Holt, *Cold War Kids,* 147.

American masculinity in the postwar era and the use of education for nationalistic goals following Sputnik came together to create that masculine space. However, this explanation disregards the role of popular culture in the formation of gender identity. What is missing from these historiographies is how popular culture particularly aimed at boys during the years surrounding the launch of Sputnik contributed to the overwhelming presence of males in STEM. Without suggesting direct causality, the following analysis of some of the popular culture directed at boys will show that the areas of science and space exploration should be male spaces. The examples provided are by no means exhaustive, but by focusing on three distinct types of media (print, television, and radio), it will become clear that the move for popular culture to reflect these ideas was not an isolated phenomenon.

From *The Twilight Zone* to *Boys' Life*: Popular Culture, Boys, and the Space Race

One of the more salient popular culture references during the Sputnik era was the March, 1958 issue of *Life Magazine* that started the multi-issue story "Crisis in Education." The front cover of the issue presents a side-by-side comparison of two boys: Alexei Kutzkov of Moscow and Stephen Lapekas of Chicago. Both are positioned in front of what is most likely their school, but the contrasts are more striking. Alexei is pictured with heavy winter clothing, staring into the camera with a sullen face while Stephen is smiling, dressed casually for a white teenage boy of the 1950s. The stoicism shown by the pictures of Alexei harkens to the value of emotional control that American manhood has traditionally valued.[19] More specifically, stoicism has also been linked to anxieties that fathers have held concerning the potential decline of masculinity in their sons: "Parents who believe that their son's masculinity is threatened may be especially inclined to encourage stoicism."[20] This juxtaposition is no accident; the subtitle of the magazine reads, "Exclusive pictures of a Russian schoolboy vs. his U.S. counterpart."[21] The ideological conflict with the Soviets, a product of militaristic masculinity for which schoolchildren were now being given the responsibility for, in this case is shown as a competition between school*boys*. [22]

In the *Life* article written and photographed by Howard Sochurek and Stan Wayman, the comparisons continue. Stephen is described as "an average student, likable, considerate, good-humored—the kind of well-adjusted youngster U.S. public schools are proud of producing" while Alexei is described as "hard-working, aggressive,

[19] Kimmel, *Manhood in America,* 37-39.

[20] Douglas Schrock and Michael Schwalbe, "Men, Masculinity, and Manhood Acts," *Annual Review of Sociology,* 35 (2009), 282.

[21] "Crisis in Education," *Life Magazine,* March, 1958.

[22] "Crisis in Education," *Life Magazine,* March, 24, 1958 can be viewed here: https://books.google.com/books/about/LIFE.html?id=PlYEAAAAMBAJ

above average in his grades—the kind of student that the Russian system ruthlessly sets out to produce."[23] The pictures that accompany

the article add to this sentiment. [24]

Alexei is constantly surrounded by science in the classroom and the pictures that show him at leisure, whether its playing volleyball or the piano, everything is a serious undertaking. In fact, only one picture of Alexei shows him smiling.[25] Stephen, on the other hand, is viewed in a very different light. The descriptions of Stephen fall under the heading: "In U.S.: Relaxed Studies," and the pictures of Stephen seem to reflect this attitude. In the pictures of Stephen in the classroom, science is harder to find. Biology class is the only direct illustration of Stephen working on science, but even then he is observing (with a smile) a dead guinea pig exhibit that was prepared by another student in his class that subsequently took first prize in the citywide science fair.[26] It is clear that extracurricular activities are more central to Stephen's academic life if the pictures are taken as representative. While Alexei thrives in an environment that stresses the hard sciences, Stephen is pictured with his tutor helping him with his weakest subject: geometry.[27] The comparisons between Alexei and Stephen are striking, and as the subtitle of this comparative article indicates, "Schoolboys point up a U.S. Weakness."[28] It is clear that this "weakness" that is perpetuated by American schooling is a problem with boys, and ergo a problem with masculinity. This article provided a type of masculinity that should be emulated in order to beat the Soviets, one that focuses on aggression, stoicism, and competition. Simultaneously, this issue of *Life Magazine* also outlined a schooling problem that would ultimately provide more funding for STEM education and research through the National Defense Education Act (NDEA): an education problem that would revolve around the classroom experience of boys.

Boys were also targeted more directly through forms of popular culture of which they would be direct consumers. *Boys' Life,* a popular magazine aimed particularly at boys with their interests in mind, debuted in their March, 1958 magazine an article titled "Memo on Moonwatch: Tracking the ESVs will call for your sharp eyes to back up scientific instruments."[29] This article was a call-to-arms where boys would play a crucial role alongside scientists in an effort to keep watch on the sky, specifically looking for ESVs (Earth Satellite Vehicle). "Moonwatching" was described as, "a responsible and challenging pursuit." More importantly, boys were being told that "America's satellite scientists are depending on the members of the observing teams to furnish the vital first

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[23] Howard Sochurek and Stan Wayman, "Schoolboys point up a U.S. Weakness" in "Crisis in Education," *Life Magazine,* March, 1958, 27. Issue can be viewed in full here: https://books.google.com/books/about/LIFE.html?id=PlYEAAAAMBAJ

[24] Howard Sochurek and Stan Wayman, "Schoolboys point up a U.S. Weakness," see page 29 here: https://books.google.com/books/about/LIFE.html?id=PlYEAAAAMBAJ

[25] Ibid 27-31.

[26] Ibid 32-33.

[27] Ibid 33.

[28] Ibid 27.

[29] Raymond Schussler, "Memo on Moonwatch: Tracking the ESVs will call for your sharp eyes to back up scientific instruments," *Boys' Life,* March, 1958, 11.

sightings of all ESV's after launching."[30] The article implored boys to report any sighting of an ESV so scientists could confirm the sighting, along with specific instructions outlining who exactly to contact. This article was another example of boys being targeted by popular culture in an effort to make the frontier of the Cold War ideological conflict, space, an appealing responsibility. Not only did *Boys' Life* have "Memo on Moonwatch" in 1958, but one of the longest-running comics in the magazine also used popular culture to market space to boys: "Space Conquerors!"

"Space Conquerors!" ran in *Boys' Life* from September of 1952 until October of 1972. The comic was the story of three men and their adventures through space, ranging from landing on the Moon and Mars to encountering extraterrestrial life. In October of 1959, the three protagonists find their way out of danger and heading back to their base on the Moon. In a direct reference to Soviet satellite technology, the conquerors float past portion of a "very early Earth rocket" and the three decide to investigate. Upon taking a closer look, they realize that a dead dog is in the piece of the rocket, a direct homage to the dog that the Soviets sent to space in late 1957 in the second Sputnik satellite.[31] One of the decidedly-American protagonists then exclaims, "She gave her life so we could finally conquer space!"[32]

Once again the message was clear: space was something to be conquered and colonized. Additionally, by having the American protagonists of "Space Conquerors!" literally float by the Soviet satellite, it signaled that America should work to surpass the progress made by the Soviets. In this instance, comics were used as medium to relay this message to boys in particular. However, this would not be the last instance of comics helping to contour the popular culture references to space and the STEM fields in general to boys. [33]

In Jeffrey Johnson's *Super-history: Comic Book Superheroes and American Society, 1938 to the present,* comics in the postwar era often depict superheroes that not only exemplify American values and frequently fight communist antagonists, but science is often used in conjunction with or the origin of their powers and abilities. Most notably, Johnson identifies Superman and Captain America being the more obvious of these examples. Captain America's origin story depicts a man-turned-superhero due to a science experiment aimed to create super soldiers. Very quickly this superhero would be pitted against communism, and in June of 1954, Captain America would embrace his new role as "Commie Smasher."[34] Superman, arguably one of the most famous comic book heroes, not only fought against communism but also was an example of popular culture that confirmed the gender roles of women. Superman's love interest, Lois Lane, was initially introduced as a "smart, savvy career woman" but by the late 1940s had transformed into merely "Superman's girlfriend."[35] As Superman and Lois Lane

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[30] Ibid 11.

[31] Al Stenzel, "Space Conquerors!," *Boys' Life,* October, 1959, 48. Full issue available here: http://planettom.livejournal.com/294248.html

[32] Ibid 48.

[33] Ibid, 48

[34] Jeffrey Johnson, *Super-history: Comic Book Superheroes and American Society, 1938 to the Present,* Jefferson: McFarland (2012), 56.

[35] Ibid 76.

transitioned into the 1950s, Lois would be presented as a woman consumed with the idea of marriage and will use "any method necessary to obtain a husband."[36] Even though these gender roles for women were pervasive throughout American society, it is worth noting that in this instance the traditional characterization of women occurred in a medium that was being read by a primarily-male audience. That same male audience that would be called upon to defend American values against communism, with a particular leaning toward science and technology. However, some superheroes were also affected during the years surrounding the launch of Sputnik.

For example, in 1956, the Flash was rebranded as a "police scientist" rather than his original storyline that debuted in the 1940s.[37] In this new reiteration of the Flash, the superhero "embodied the American foreign policy of containment:" the Flash and his alter-ego Barry Allen served as paragons of this policy because along with using science in combination with law enforcement, the Flash could literally not be contained due to his superhuman speed.[38] This idea of superheroes embodying these American values continued in 1959 with the premiere of DC comic's newest superhero: Green Lantern. "Hal Jordan became a member of an intergalactic police force when a dying alien gave him a ring that could turn thought into reality," and it is made clear that Hal Jordan was chosen because "an American…was the most qualified candidate. No other nation could have produced someone so exceptional."[39] The Flash and the Green Lantern are both examples of popular culture embodying American values of exceptionalism, law and order, and the use of science in order to battle foes; values that were aimed at boys during the years surrounding Sputnik's launch.

Many prominent comic series were in response to the anxiety created after Sputnik's launch. In 1957, Jack Kirby pitched the idea of *Challengers of the Unknown* to DC comics. *Challengers* featured "a team of four daredevils" who "reflected the values and gendered expectations" and "themes of contemporary unease about the trajectory of scientific accomplishments."[40] Even though *Challengers* existed for a limited time, Kirby would also play a role in developing Marvel comic's response to the popular series depicting a team of superheroes that DC had recently made into a popular series: The Justice League. That response was the Fantastic Four.

The origin story of the Fantastic Four built on the ideas that Kirby presented in *Challengers:* risk-taking in the face of scientific uncertainty with a heavy dose of gender performance. Dr. Reed Richards, who would later be known as Mr. Fantastic, is depicted as a scientific genius but is frightened about his upcoming mission of leading the United States to being the first nation to travel into outer space. Susan Storm, Richards' fiancé

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[36] Ibid 77.

[37] Ibid 57.

[38] Frederick A. Wright, "'I Can Pass Right Through Solid Matter!': How the Flash Upheld American Values While Breaking the Speed Limit," in Chris York and Rafiel York, eds., *Comic Books and the Cold War, 1946-1962: Essays on Graphic Treatment of Communism, the Code, and Social Concerns,* Jefferson: McFarland (2012), 57.

[39] Jeffrey Johnson, *Super-history,* 57.

[40] Phillip Payne and Paul J. Spaeth, "Jack Kirby's *Challengers of the Unknown:* Establishing Order in an Age of Anxiety," in Chris York and Rafiel York, eds., *Comic Books and the Cold War, 1946-1962: Essays on Graphic Treatment of Communism, the Code, and Social Concerns,* Jefferson: McFarland (2012), 68.

and later known as the invisible woman, eventually convinces the doctor to star the mission that eventually flies them into a cosmic storm. The encounter with the cosmic storm gives everyone on board amazing powers.[41] The Fantastic Four became a popular superhero franchise, and the cultural representations that a primarily-male audience received are clear: science and the search for scientific discovery are not only tools to defeat the Soviets but they can lead to superpowers. The men in the Fantastic Four, Mr. Fantastic, Human Torch, and the Thing all have aggressive and militaristic abilities. Mr. Fantastic stretches his body to incredible lengths, Human Torch has the ability to burst into flames and fly, and the Thing has superhuman strength aided by his stone-like flesh. In stark contrast, the female team member, The Invisible Woman, has the ability is to literally disappear. To recap using the metaphors of this comic, scientists can gain superhuman powers by travelling to space wherein men gain the ability to fight their adversaries while women disappear. In previous examples, the simple omission of women and girls from these scientifically-based popular comics or the harmful stereotypes depicted by characters such as Lois Lane portrayed the fight against communism that superheroes engaged in as a masculine space. However, in this example, the woman that is included in a group that had a clear goal of a large scientific accomplishment received the ability to disappear thus signaling what may indeed happen to women in the battleground of space.

This is not to say that women in comics were always omitted or cast in traditional gender roles. For example, Ruth McClelland-Nugent argued in her article "The Amazon Mystique: Subverting Cold War Domesticity in *Wonder Woman* Comics, 1948-1965" that Wonder Woman challenged the idea of female domesticity in this era, albeit with some contradictions. For example, Wonder Woman was shown to be a strong, independent female character that was also a fierce warrior but juxtaposed with images of lauding the idea of marriage and wearing fur coats.[42] In addition, invisibility is still a vital part of the Wonder Woman character in the form of her invisible jet. That being said, even though Wonder Woman provides a brief respite from the onslaught of male-dominated comics, the popular cultural images and themes of scientific discovery and battling communism proved to be a rather masculine space. From comics in *Boys' Life* magazine to the Fantastic Four, boys were inundated with the idea that their role in society was to fight communism along with their superhero idols. This fight, which other popular culture references had linked with science education after the launch of Sputnik, contributes to the idea that popular culture helped to form the masculine space within the STEM fields. However, print culture was not the only avenue to advance this phenomenon.

Television also was an important medium for popular culture during the postwar years. One of the more popular television programs of that era *The Twilight Zone,* often tackled social and political issues in the content of its episodes. In September of 1961,

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[41] Rafiel York, "*The Fantastic Four:* A Mirror of Cold War America," in Chris York and Rafiel York, eds., *Comic Books and the Cold War, 1946-1962: Essays on Graphic Treatment of Communism, the Code, and Social Concerns,* Jefferson: McFarland (2012), 204.

[42] Ruth McClelland-Nugent, "The Amazon Mystique: Subverting Cold War Domesticity in *Wonder Woman* Comics, 1948-1965" in Chris York and Rafiel York, eds., *Comic Books and the Cold War, 1946-1962: Essays on Graphic Treatment of Communism, the Code, and Social Concerns,* Jefferson: McFarland (2012), 125.

season three of *The Twilight Zone* premiered with an episode titled "Two." "Two" was a story of a post-apocalyptic wasteland and follows two soldiers, one man and one woman, as they try to survive in their environment. Both donned military uniforms; however, without directly applying the insignias of the day, it becomes clear that the man is American and the woman's garb resembles the uniforms worn by Eastern European communist countries.

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Upon seeing the man, the woman recognizes the uniform and begins to attack the man. The woman is not able to understand the man's pleas in English to stop fighting, so the man resorts to knocking the woman unconscious. Upon regaining consciousness, the woman reluctantly starts walking through the town with her male enemy when they come upon two firearms lying next to decaying skeletons. The two immediately turn the weapons against each other and proceed with a very tense standoff. Cooler heads prevail, but both keep the firearms for security. Despite more tense moments like the standoff, mostly a product of the woman observing propaganda posters that offend her, the two strangers walk off in the end of the episode as a romantic couple, walking into the sunset.[44]

[43] "Twilight Zone episode 'Two' original air date September 15, 1961. Frame grab.

[44] Montgomery Pittman, (Writer, Director) and Rod Sterling(Writer), "Two," *The Twilight Zone,* Culver City, California: Columbia Broadcasting Company (1961).

The symbolism and imagery in this episode are fairly straightforward: the side of the conflict that represented the communist antagonist was female, the American was male, and the female was presented as either in direct conflict with the male protagonist (which authorized the use of violence against her) or a love interest of the man. This episode was, by no means, the only example of communism being associated with the effeminate.[45] However, as boys were being targeted as the hope of defeating communism, this imagery in the early 1960s became crucial to defining the participants of this ideological conflict. That conflict, in which Americans put a heavy emphasis on science education, was depicted in this *Twilight Zone* episode as a side that was decidedly masculine versus a side that embodied the feminine.

Television programs that had less serious political and societal overtones, such as *Make Room for Daddy,* also presented science and Cold War-oriented themes. *Make Room for Daddy,* also known as *The Danny Thomas Show,* was one of the top television shows in the late 1950s.[46] In an episode titled "The Reunion," which aired in December of 1958, follows leading-man Danny Thomas as he reunites with his friends from his past. Danny begins the episode feeling good about the career that he had made for himself after only one year of high school. The tide quickly turns, however, when Danny meets his friends that went on to a post-secondary education and now hold positions of high esteem. Two of Danny's friends went into the sciences: one as a surgeon and another as a prominent NASA scientist. The remaining friend is a senior member of the diplomatic corps.[47] Only a year after the launch of Sputnik, this episode depicts the outcomes of Danny's successful friends that received a higher education to either be in the sciences or involved in foreign policy. These were not the only options offered in higher education during this time; nevertheless, it cannot be a coincidence that a television program which aired so close to the Soviet satellite launch would depict successful higher education as being involved in these two particular fields. In addition, all of these successful recipients of higher education in the fields of science and foreign policy were men. While television was beginning its transformation into one of the most utilized transmitters of popular culture, radio still held the attention of many Americans.

Years before Saul Sternberg denied the applicability of his science experiment to the atom bomb, "Adventures in Science" would support the masculine exclusivity of science through the treatment of young women scientists that would go on the program. In a broadcast in February 1945, Science Talent Search winner Marion Joswick went on the program and discussed her interest in metallurgy. The announcer asked Joswick, "That's a rather unusual occupation for a girl, isn't it Marion?"[48] This sentiment would continue into the next decade. In February of 1954, Janet Rountree went on the program to explain how she succeeded in creating her own water softener. The

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[45] Michael Kimmel, *Manhood in America,* 155-156.

[46] "TV Ratings – 1950s," *fiftiesweb.com,* accessed September 22, 2016, http://fiftiesweb.com/tv/tv-ratings/.

[47] Sheldon Leonard (Director), Charles Stewart (Writer), and Jack Elinson (Writer), "The Reunion," *Make Room for Daddy,* Los Angeles, California: Marterto Productions (1958).

[48] "Adventures in Science" script for 17 February 1945, SIA RU 7091, Box 391, Folder 1 in Sevan G. Terzian, "'Adventures in science': casting scientifically talented youth as national resources on American radio, 1942-1958," *Paedagogica Historica* 44, no. 3 (2008), 323.

announcer asked Rountree if she was "trying to produce something to help the housewife get rid of her washday blues?" When Rountree went on to clarify that she had made softening chemicals in the form of polystyrene beads, the announcer quipped, "That isn't what I expect a girl to do with a string of beads, but go on—or are you stringing me?"[49] Even though "Adventures in Science" gave young women that were interested in science airtime, it became clear that their status in science was an inferior one to boys. "Adventures in Science" would leave the airwaves shortly after the launch of Sputnik, but the effect of the unequal gender representations on the program would continue in the program that "Adventures in Science" advertised: Science Talent Search.

Science Talent Search, which started in 1942 and continues to this very day, provided an interesting insight into how young women were as marginalized in the science community as much as "Adventures in Science" would make it seem. In 1958, only one young woman finished in the top three in that year's talent search: Jane Shelby. Shelby, whose project determined the orbit of the Sputnik satellite from amateur observations, did not win the talent search despite constructing her project in accordance with the expectation that science should intersect with national security interests. This omission is striking considering that *Boys' Life* had asked boys to do the exact same in their "Memo on Moonwatch" article. Despite having a female winner in 1945, young women remained out of the top three of the Science Talent Search from 1958 until 1971.[50] Even with consistent participation of young women, the Science Talent Search apparently determined that young women scientists did not produce top-three-worthy work for thirteen years following the launch of Sputnik. Was this indicative of young women's experience in science in an educational and career setting? Two reports shed light on the answer to this question.

In 1969, the National Merit Scholarship Corporation (NMSC) produced a report titled "Career Decisions of Talented Youth: Trends Over the Past Decade." In the study, tables are used to map the choice of college majors for male and female finalists of the National Merit Scholarship from 1958 until 1967. The largest categories by far for males are engineering and physics coming in at 29.59 percent and 18.8 percent respectively for the first year of the study, 1958. Despite decreasing every year in the study, those two fields remained first (engineering) and third (physics) ten years later with mathematics increasing to take over second place.[51] In contrast, the top two female choices in 1958 were English and mathematics with languages coming in third. Even though mathematics remained stable for female finalists of the National Merit Scholarship, physics was chosen the most frequently in 1958 and declined precipitously from 4.17 percent. Engineering was also at a high point for females immediately following Sputnik, but only comprised of 2.04 percent of the female finalists' choices.[52] Science

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[49] "Adventures in Science" script for 20 February 1954, SIA RU 7091, Box 400, Folder 54 in Sevan G. Terzian, "'Adventures in science': casting scientifically talented youth as national resources on American radio, 1942-1958," *Paedagogica Historica* 44, no. 3 (2008), 323.

[50] "STS Alumni by Year," *Student Science: A Resource of the Society for Science & the Public,* accessed February 15, 2016, https://student.societyforscience.org/science-talent-search-1958.

[51] Donivan Watley and Robert Nichols, "Career Decisions of Talented Youth: Trends Over the Past Decade," Evanston: National Merit Scholarship Corp. (1969), 5.

[52] Donivan Watley and Robert Nichols, "Career Decisions of Talented Youth: Trends Over the Past Decade," 8.

education, which held national defense policy implications after Sputnik's launch, was at this point a masculine space. Unfortunately, given the historical context surrounding the Cold War in terms of gender equity, this is not surprising. What is surprising, however, is that despite science education becoming a national security priority, the large portion of young women were not even privy to introductory courses in disciplines such as physics.

Haym Kruglak's 1972 study of the physics background of college freshmen at Western Michigan University after the launch of Sputnik reflects this trend quite nicely. In his first statistical table, Kruglak documents the percentages of freshman that took a course in physics during high school. According to the table, in 1958 61.3 percent of males and only 21.9 percent of females had a course in high school physics. Five years later in 1963, both sexes showed an increase to 66.4 percent and 32 percent respectively. Most telling, however, is that ten years after the launch of Sputnik only 19.6 percent of females had taken a course in high school physics.[53] These reports would suggest that young women were either being excluded or encouraged away from STEM fields prior to their college experience following the Sputnik launch.

Conclusion and Areas of Further Study

In February 2016, Tania Lobrozo of the University of California, Berkeley wrote an article for NPR on the experiences of Eileen Pollack, a physics major at Yale in the 1970s, and her book *The Only Woman in the Room*. Pollack's book described the isolation that she felt being a woman in STEM during the 1970s. Despite a very early interest in science, Pollack ran into educational and societal influences "that can make it difficult for young women to identify as scientists and work with male peers in the lab."[54] The exclusion of women in STEM, and thus the masculine space created within it, can be linked with the societal influences that developed around the launch of the Soviet satellite Sputnik. Since gender is performative, that performance can be influenced by gender norms in popular culture. The norms in popular culture can either be reflective of the prevailing gender performances or display performances that society deems that *should be* performed. What popular culture of the postwar era told boys was that science and space were worthwhile endeavors. Following adventures into space would give boys something to conquer and may even give them superpowers. In this conflict, it would be boys who would lead the fight in the laboratory and on the pages of their favorite comics. Girls and young women, if included at all, would literally and figuratively disappear. While these examples of popular culture do not provide direct causation of a masculine space within STEM, there is no doubt that popular culture contributed to that space. In the postwar era, the notions of masculinity surrounding the Cold War and changes in national science education policy grounded much of the popular culture that was consumed by boys in particular. That foundation, while not the sole cause, contributed to the masculine space within STEM that persists today.

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[53] Haym Kruglak, "The Physics Background of College Freshmen Ten Years after Sputnik," *The Physics Teacher* 10 (1972), 331.

[54] Tania Lobrozo, "What is it Like to be 'The Only Woman in the Room'?, *NPR,* published February 15, 2016, http://www.npr.org/sections/13.7/2016/02/15/466799499/what-is-it-like-to-be-the-only-woman-in-the-room.

What will need to be researched further in the future is the whiteness of this masculine space. One of the more important points of intersection in America is race. Neglecting something as important as race would not only be inaccurate but historically irresponsible. Due to the fact that researchers have failed to integrate the study of masculinity in America and science education puts me as a researcher in a bind: in order to provide a "first glance" of sorts into this intersection provides that I lay out an appropriate overview. However, with limited space in one article, I would not wish to give an inappropriately short amount of attention to race if I did decide to include it directly in my analysis. Popular culture of this era was primarily aimed at a middle-class, white audience. The introduction of race would provide another aspect of how popular culture created a space within STEM that largely excludes on the basis of race in conjunction with gender.

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