

Future is Female:

Prescriptive Gender Stereotypes and Media Messaging About Women in STEM

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Abstract

Many young women show an interest in career paths in the technology industry, but through various processes their presence in the industry itself is diminished in comparison to their male counterparts. Societal stereotypes regarding gender roles and the subsequent success in STEM fields have an effect in deterring women from these fields. Namely, it is the notion that STEM fields require agentic qualities, such as dominance and competition, and these are not qualities that are stereotypically attributed to women. Historically, this stereotype coupled with the culture of competition prevalent within STEM has negatively affected the involvement of women. Examining and understanding how these stereotypical gender qualities are presented in film media will be the focus of this research. Although the amount of media representation women in STEM receive is still minimal, in recent years there seems to have been a shift in their presentation. The media explored in this study portray female characters in STEM fields that are confident in their intellectual abilities and are contributing to communal efforts, which strongly counters the competitive perception of STEM fields and questions if dominant qualities are required to be successful in this realm. This thesis will be analyzing the messages about female characters in technology and STEM roles in films, specifically four films: *Annihilation* (2018), *A Wrinkle in Time* (2018), *Black Panther* (2018), and *Ocean's 8* (2018).

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Background

At the University of Southern California's Viterbi School of Engineering's undergraduate commencement ceremony in 2018, the Dean announced that 45% of their graduates this year were women (Ballon, 2018). At the University of Washington, approximately 40% of the Information School's latest cohort were women. However, when you look at the statistics in the workforce, less than 25% of professional computing or technology positions are held by women (Bose, 2018). That is a 20% difference in graduating and working women in their field of education. At younger ages, there seems to be even more of an interest in these fields among girls. In a poll conducted by the Girl Scout Research Initiative (2012) at a middle school, approximately 74% of girls expressed interest in science, technology, engineering, and mathematics, also known as STEM, fields and specifically technology related paths such as computer science. Through these statistics it is clear to see that there is a point at which girls who were once interested in these careers are deterred from entering the profession. Specifically, women are not transitioning from the educational sphere into careers in all STEM areas, particularly the technology related fields. There are many potential reasons as to why these women are not transferring into the workforce, both from their decisions to go into the field, as well as external societal factors that influence their ability to do so. Some of these external factors include media, peers, educators, and the technology industry, which all relay messages that impact the status of women in technology, and it is important to understand these messages to decide what type of action needs to be taken.

As a vehicle for culture and education, film is one of the main forms of messaging society receives. Movies are good for societies for more than just economic prosperity, as movies have the opportunity to influence a large audience of individuals. Film and its “innovations sometimes ha[ve] to catch up to society, but sometimes it leads society” as well (Sherak, 2011). Many individuals are inspired by films and are motivated to change their ideals and beliefs based on what they view in this media. This is profoundly due to the ability for motion pictures to allow the individuals of society to participate in the story telling process, as an “individual has [the] opportunity to project [them]self into situations and in some degree share in experiences otherwise denied” to them (Fearing, 1947). Films shape the mentalities of individuals by showcasing opportunities that are inaccessible to them, thereby directing or influencing the life choices of these individuals. Movies themselves are one of the most accessible forms of art to all walks of life, providing a common experience for all. Young people at adolescent ages are especially affected by what they view in films, as they are still shaping their worldviews and are open to absorbing various influences (Pautz, 2015). This is why the lack of female representation in film is so detrimental to their inclusion and empowerment in society. Women made up only 34% of speaking characters in top-grossing films in the United States in 2017 and were only featured in the lead role in 28% of those films, which is a large mismatch to reality where women make up 51% of the US population (Davis, 2019).

The lack of representation of women in film in general leads to a lack of representation of specifically women in STEM fields. The underrepresentation of women in media makes it difficult for society to envision women as being an equal group in these fields. This reinforces the idea of competition that is already prevalent in the STEM field, potentially dissuading even more women from joining. STEM fields are notoriously stereotyped as competitive, and

furthermore, not collaborative. This is likely rooted in the fact that STEM is usually at the forefront of cutting-edge innovation and technology that can put societies ahead in solving theirs and the world's problems. STEM plays an integral role in maintaining or advancing a nation's economic and societal competitiveness, making it a very lucrative field to be involved in. This competitive nature seeps down into the field, creating rivalry amongst individuals even pursuing the field. In the educational realm, many colleges make their STEM coursework much more difficult to succeed in, which can be discouraging to all students. Looking younger, science competitions, which are meant to be a positive way to initiate science and technology innovation, are already seeing more boys entering than girls. A study indicated that male students won more awards and participate at higher rates than females in almost every science competition (White, 2019). This study focused on the gender disparities seen in science Olympiads versus science fairs, where Olympiads are more competition based while fairs are more collaborative, and discussion based. The gender inequality was less visible at science fairs compared to Olympiads, and this could be rooted in the stereotypes regarding competition culture. As competition culture is prevalent in the STEM fields, its relevance to gender should also be noted as a potential factor in affecting the gender imbalances seen in these fields.

As there are many women that show an interest in STEM fields, it is interesting to note the lack of gender equality in the industry itself and furthermore, see this displayed in media messaging. Societal stereotypes on gender roles are present in various aspects of society, such as film and education, and these can have an effect on individuals and their career interests. With STEM fields, there are stereotypes that portray the necessity of agentic qualities, such as dominance and competition, in order to be successful in these paths. The culture of competition in STEM and the stereotypes associated with it can be seen in film, however, it seems there has

been a shift in this presentation in recent years. This could be indicative of a cultural change in the notions surrounding women in STEM and this will be further explored in this study.

Conceptual framework and theory

For the purposes of this paper, I will be distinguishing between all STEM fields and technology-based fields, which is a more specific sub-category. Although STEM encompasses science, technology, engineering, and mathematics, this paper aims to focus on technology related fields, which includes computer science, information science, electrical engineering, computer engineering and more. In this study I will be focusing on the women in these technical roles, and less so on the life sciences roles of STEM. However, in film sometimes the specific distinctions between the STEM fields are not depicted clearly or entirely plausible in a film's setting. All the films in this study feature at least one female character with interest and involvement in STEM, specifically technically based.

Gender is also a main focus of this thesis, and because there are disagreements on the definitions of gender versus sex, for this study I will define it in the following way. In this paper, gender will be based on self-identification; so, a woman is considered as any individual who identifies as a woman regardless of biological sex. This is for any self-reporting surveys, data collection done on the industry, and within the film's characters. This paper discusses the effects of stereotypical gender roles on individuals, and gender roles are most influential on individuals based on their self-perception of gender. With this in mind, any character identifying as a woman will be taken as such.

Sexism and gender bias, as well as gender discrimination, are crucial terms in the discussion of women's inclusion in the STEM fields. Sexism or gender bias is prejudice based on a person's gender, normally against women. Gender discrimination encompasses sexism and

includes discrimination against individuals based upon their gender identity. As all facets of this prejudice is rooted in gender as previously defined, this paper will include discussion of sexism, gender bias, and discrimination interchangeably.

There is also a distinction that needs to be made between gender equity versus gender equality. At a basic level, equality refers to providing equal opportunity to all individuals, while equity refers to mitigating the various other obstacles to ensure a greater fairness of outcomes. According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), “gender equity means fairness of treatment for [all genders] according to their respective needs”. Most of this research will center around gender equality, as the focus is on female STEM representation in film. This is not to minimize the importance or validity of equity, especially in the pursuit of women’s involvement in the technology industry. The focus on gender equality for this study comes from the fact that representation refers to portrayal and having an equal presence in media does not signify equity for genders.

Methods

Previously, there have been measures in place to evaluate the levels of gender equality in film and other media, one of the most notable ones being the Bechdel Test. The Bechdel test is a measure of female representation in media and calls into question the gender inequalities present in said media. The test asks whether the media in question features a conversation between two named female characters, where the topic is something other than a man. Colloquially the test has become a household phrase used to address whether or not a film or piece of media was promoting positive portrayals of women. However, the test as a stand-alone has been rejected by many as a proper test for feminist content as the test has drawn many criticisms. The test itself “was never meant to be a measure of feminism, but rather a cultural barometer” (Zeisler, 2016).

There are many loopholes and gamifications to the test where bad films could pass easily without actually being beneficial to women and gender equality. In the same vein, a film could fail the Bechdel Test for a variety of reasons, but potentially be a positive representation of women. For example, the film *Gravity* (2013) famously does not pass the Bechdel Test as Sandra Bullock, the protagonist, is the only female character in the film and one of two starring characters in the film total. There is no opportunity for Bullock's character to even speak with another woman, therefore no way to apply the Bechdel Test. However, the film itself depicts Bullock as a medical engineer and mission specialist who is on her first space mission and in this case, having the female representation in a strong STEM based role is much more beneficial than passing the Bechdel test.

The Bechdel Test has given room for numerous other tests of similar nature to arise, all with the goal of measuring gender representation in film. One such test is the Peirce Test, which focuses on the depth of the female character presented in a film. The test postulates that the film must feature a female character, protagonist or antagonist, "with her own story, who has dimension and exists in an authentic way, showcasing her needs and desires which she ultimately pursues" in actions (Waters, 2018). This test is much more subjective compared to the Bechdel Test, as it requires the audience to empathize with a woman's needs or actions. Another such test is the Landau Test, which more focuses on what a film should not include, rather than should, in order to promote positive gender representation of women. A film will fail the Landau Test if a main female character ends up dead, pregnant, or if she causes a plot problem for a male protagonist. The vagueness of these tests allows for ample room for numerous films to pass. However, even idea this becomes less executable when films fail to feature enough female characters to even apply the test to. In an analysis done of 120 theatrically released PG rated

films worldwide from 2010-2013, only 31% of named characters were female, and only 23% of the films even had a female protagonist or co-protagonist (Choueiti et al., 2014). The overall minimal representation of women makes for the probability for positive representation to be slim.

With these types of tests in mind, I attempted to conduct this study in a more wholistic and subjective manner rather than focusing on specific quantitative data. The data and analysis for this study will primarily be through a qualitative study of films regarding or involving women in STEM fields. Qualitative data is better suited for this study as it takes into account the contexts within which the women are operating, such as their experiences and interactions and how that reflects on their career choices in STEM fields. This observational method also alleviates some of the vagueness that is described in the quantitative tests above. Rather than applying a test to a film prior to having information on it, the qualitative method in this study attempts to understand the framework and the perspectives in the film and comprehend the messaging regarding women in STEM.

The research will conduct a deeper analysis on four films, all of which were selected through the same process. All the films were produced and released in the United States between 2016-2019. The time frame was selected keeping in mind the historical events that surround the time period within the country of release for the films, which is the United States. In 2016, Hillary Clinton ran for president as the first female nominee of a major US political party, but she lost to Donald Trump. Many attributed this loss at least partially to a deep-rooted misogyny within the country. Clinton even said there is a “a cultural, political, economic game that’s being played to keep women in their place” (Hillary Clinton, 2017). While Clinton’s failure did not shift personal attitudes towards female leaders, it did increase perceptions and the belief that the

women's male counterparts were at an advantage. This feeling was further perpetuated by the fact that Clinton lost to a candidate whose election relied heavily on rhetoric that was considered anti-women and was otherwise offensive to many segments of the country. Furthermore, Trump has been accused several times over of sexual misconduct. Much of this came to light during his presidential campaign after the release of an audio recording from 2005 where Trump described a lewd encounter with a married woman, using language which lawyers have categorized as sexual assault.

In response to these events in the political sphere, there was a cultural shift with many individuals beginning to speak out against the discrimination and harassment they were seeing and facing. One example of this was the initiation of the Women's March, which happened the day after Trump's inauguration as a direct counter protest. Another major effort that was sparked was the resurgence of the #MeToo movement, which is a movement for speaking out against the sexual harassment of women. At the same time of this political turnover and discussion of the treatment of women in that realm, there were similar conversations happening in media. In 2016, Fox News television host Gretchen Carlson filed a sexual harassment lawsuit against Roger Ailes, the chairman of the company. This led to rumors of similar behavior from Harvey Weinstein, a major Hollywood film producer, which after investigation turned out to be true. The Weinstein scandal brought about a national reckoning against sexual harassment in the United States and deeply affected the media and film industry. As a major historical point in the country, this event affected the film industry and marks a turning point in media culture. All the films that were selected for this study were released in 2018, with some amount of filming or production happening during 2016-2017.

The main selection factor for the films was through the identification of the female roles. Although the overall pool of films released in the given time period was large, with the focus of this research being on women in STEM, the films needed to include a female character in a STEM role to be considered. The film has to feature at least one named female character in a speaking role, and the woman has to be in some STEM related occupation or executing some knowledge in this field. This does not necessarily need to be her career, as in some genres of film the setting does not lend itself to an office space. The character also did not have to be the main character or protagonist of the film, as her interactions with the individuals around her will be revealing regardless. It is important to note that although race makes a large difference in the messaging of films, as minorities are consistently featured in fewer roles, and the intersectionality is an important factor, the race of the female characters was not taken into consideration when selecting the films. Race will be discussed when appropriate however it was not a selection factor as the focus of the research is on all women in STEM fields regardless of their race. Even just this requirement narrowed down the pool significantly to just a handful of films.

Another control that was set for the selection was that the film's storyline had to be entirely fictional. Many films have been made in recent years about historical events or real women that have made significant impacts through their roles, such as *Hidden Figures* which focused on female mathematicians working at NASA, or *Bombshell*, which actually focused on the allegations against Roger Ailes and the women who brought those forward. However, the goal of this research is to focus on societal perceptions of women in STEM. Society's viewpoints can be seen clearly through the worlds that are imagined, as fiction overlaps with social theory and allows for discussion of the theoretical imagination. Fictionalizing the theoretical

imagination provides a space for reflection and pushes out of the conventions of academics and previously established ways of thought within society (Beer, 2015). Films, along with other forms of media, are a perfect vehicle for these fictional ideas to challenge the societal norms, illuminate conceptual blind spots, and make way for new avenues of thought. This is why fictional films were selected for this study as they can hold a mirror up to the existing gender inequality in the STEM industry, as well as potentially provide new insight to the issue.

Genre was not taken into consideration for selection, as the pool was already small that it was difficult to find movies within a single genre that included substantive female characters in STEM roles. Three of the films are in the science fiction genre, which typically lends itself nicely to STEM field inclusion, and the last one is a comedy set in reality. The effects of the film's genre on its characters were discussed.

The first step in the analysis process was to watch all the films in their entirety, just as a general viewer to grasp the entire storyline, the characters, and the major themes presented. Then, I conducted some basic research on the films, such as reading relevant news articles and press releases surrounding the subject and taking note of what viewers were noticing when they viewed these films at the time. In my subsequent viewings of the films I noted down key characters and important scenes or dialogue that illuminated some findings from the literature reviews that had been previously conducted. Through these records I was able to draw connections not only to the literature, but also between the films.

A total of four films were selected for this paper: *Annihilation*, *A Wrinkle in Time*, *Black Panther*, and *Ocean's 8*.

Literature Review

Gendered Media

The history of women in the workplace in general has evolved greatly, but equality has not been achieved, especially in technology career paths. In 1985, the technology industry peaked with its women involvement at 38%, and has declined since then (White, 2010). One major cause of this is noticeably media messaging the public is receiving in regard to women in these fields. To describe this phenomenon, there is a term is known as gendered media, which simply discusses the subject of how gender is represented within media including news, television, films, video games, and all other types of media (Wood, 1994; Ross, 2013). The typical American woman of the late 20th century, through the lens of how the media portrays them, seems to be submissive and unconcerned with the happenings outside the home. They are depicted as “beautiful, very thin, passive, and primarily concerned with relationships and getting [married]” (Wood, 1994). Contrastingly, “there are a few bad, [devious] women, and they are not so pretty, not so subordinate, and not so caring as the good women. Most of the bad ones work outside of the home, which is probably why they are hardened and undesirable.” (Wood, 1994). This description is based off of a collection of media, but overall there was minimal content on women in general. This stereotypical representation of women has continued through time, where females are shown in stereotypical roles 76% of the time where they are “not making important decisions at [or] outside [the home], [and are] dependent on men” (Kumari & Joshi, 2015). For the most part media shows girls in stereotypical manners, as one study noted that “females groomed, whined, shopped, did chores” as they were “nurturant, domestic, passive, and dependent” (Ward & Walsh, 2008). The lack of representation in the media coupled with the stereotypically negative impressions that were being portrayed is generally unfavorable to women and indirectly, their pursuit of technical careers as it is outside the realm of domestic duties.

This idea that women are not meant for technology related careers starts at a young age through the process of socialization. Socialization is the process by which individuals internalize group and societal attitudes such as the perception of gender roles and it begins at birth (Lengermann, 1985). This social learning occurs in various settings, such as from family interactions, school education, and media consumption. With media consumption, there is already evidence that denotes the profound effects of film and television media on individuals. Specifically, in relation to gender, audience identification with characters and the reaffirmation of gender beliefs through these relations are crucial (Coombe & Davis, 2013). Social cognitive theory suggests that identifying with a character is an essential part of absorbing the content presented (Coombe & Davis, 2013). Gender is an integral part of one's identity and one of the main factors that makes a particular character relatable to viewers. For example, young girls will tend to relate to other adolescent girls that they view in media. Therefore, for women, the absence of female characters or the placement of them in stereotypical positions can have a negative impact on self and societal perceptions.

One stereotype that is shown through media is that of women being less exciting or inquisitive as men. One interviewee of Wood stated that when she was younger, the books in the boys' section of the library was "full of adventure and bravery" and she wondered why the girls did not have the "fun stuff and the exciting things" (Wood, 1994). In regard to STEM fields, technology currently is at the forefront of society and if women who are interested in this see it as exciting and fun, due to reinforced stereotypes from a young age they might believe that the field is not for them.

Another stereotype that is seen in macrosocial settings of media is the incompetence of girls, especially in regard to intellectual pursuits such as the STEM fields. One example can be

seen in children's toys, when a version of a Barbie initiated some negative feelings in young girls and their interest in STEM fields. In 1992, Mattel released a talking Barbie that said, "Math class is tough". The young girls who played with the doll were subconsciously absorbing this message and this would embed into their minds that they should also feel that math is tough for them. This direct view that women are not intended for STEM and subsequently technology careers starts at a young age through all types of media. This American stereotype is still pervasive today, as a study conducted on elementary school children in Seattle showed boys associated math with their own gender while girls associated math with boys, not themselves or their own gender group (McElroy, 2011).

Wood describes the stereotypical portrayals of women, particularly focusing on how women in media are depicted as "dependent, ornamental objects whose primary functions are to look good, please men, and stay quietly on the periphery of life" (Wood, 1994). In all forms of media, from children's programming to news broadcasts, women are seen to be the support objects to the male's main focus. This idea is furthered when girls are described in relation to their male counterparts. In media representations of male-female relationships, it is recurrently shown that "men are the competent authorities who save women from their incompetence" (Wood, 1994). Many stereotypes paint women as dependent on men, unable to make decisions for themselves or function in any capacity without a male figure present (Ward & Walsh, 2008). A prime example of this can be seen through the damsel in distress archetype where a female character, usually described as beautiful and innocent, is placed in a situation where she is helpless and unable to protect herself, thereby needing the assistance of a strong male hero character. In some classic film depictions of this archetype, such as *King Kong* (1933) or *Godzilla* (1954), the female character is rescued from a villainous being by the hero male. Even

in other films where it seems the protagonist is the female, such as *Snow White* (1937) or *Cinderella* (1950), the narrative follows the titular female character, however she is not the hero, she is a damsel. She is merely the object that is acted upon by the male protagonist, the subject who is acting (Curtis, 2015). A female's role in media storytelling has predominantly been in this position of distress, which shapes the societal dominant truth and in turn the continued media portrayal of this archetype (Solis, 2016). The continued usage of this archetype reinforces traditional relationships of male superiority while women are considered weak and incapable of success, especially without men.

Moreover, most of the times that women's achievements are discussed in media they tend to be overshadowed by the stereotypes and questions regarding their home life, which does not generally happen with men. In traditional American gender ideologies, women are believed to be better homemakers, tending to the domestic life and raising children, while men are described as the breadwinners (Coombe & Davis, 2013). This translates into media representation as well, as one of the most common roles for women in children's programming is a maternal figure. In *Winnie the Pooh*, of the eight main characters there is only one female, Kanga, and she is a mother. Although her presentation as a mother is not inherently negative, as with all representations of motherhood in children's programming, characterizing and emphasizing women in this role limits the range of possibilities (Green, 1997). A study of these maternal characters across television also showed that the mothers were primarily portrayed in a way that did "not support changes in women's roles" (Dail & Way, 1985). These ideologies are pervasive to the rest of society, affecting more than just female self-perceptions. It is notable that historically, men have held more traditional views on the gendered division of paid versus unpaid responsibilities in a household (Coombe & Davis, 2013). Men more so tend to agree with

the ideas of women being more domestic, which shows the effect of these gender ideologies on people other than just the women in those positions. Societal views are shaped by gendered media, and the portrayal of women in an exclusively maternal and domestic role deters the vision that they can hold positions outside the home, even in traditionally masculine roles.

These stereotypical portrayals of women can cause them and the rest of society to believe that they are not cut out for these technical roles in the industry. Constant renderings of subordination do not appeal to individuals seeking high-powered, fast-paced careers in the technology industry, potentially leading women away from these fields and this industry. Media messaging plays a huge role in the inclusion of women in the technology industry, as it is pervasive to all aspects of society. Women are consistently underrepresented and misrepresented due to these stereotypes in media, which in turn negatively affects their involvement in various STEM fields and the industry as a whole. Wood (1994) initially correctly identified that this ideology of gendered media starts at a young age, and then persists through time and over various mediums. Gendered media will continue to exist throughout film culture; however, it is what is being portrayed and the subconscious stereotypes they address that must be altered to assist in the inclusion of women.

Competition Culture

There is a prevalent culture of competition within STEM and the technology industry, and it is subtly and consistently reinforced through various mediums. To compete is defined as “to strive to gain or win something by defeating or establishing superiority over others who are trying to do the same” (Merriam-Webster). An example of this in practice can be seen at many universities; the competitive nature of the University of Washington’s system of capacity constrained majors, where students are forced to apply for a limited number of seats in a major,

overwhelmingly negatively affects the technology majors such as computer science and informatics. Through this one is able to see the pervasiveness of this culture of competition, which also disproportionately disturbs women in these fields of study due to the societal gender norms that expect female aversity to competition and the lack of gender diversity in STEM fields specifically.

At a basic level, competition is categorized as an inherently masculine quality and stereotyped as such. Generally, “prominent gender stereotypes describe males as more agentic and women as more communal in nature,” as men are perceived to be more innately inclined to exert dominance and control (Buontempo et al., 2019). Competitiveness falls under this umbrella of agentic qualities, as a trait by which dominance is asserted. This gender stereotype prescribes that men should be more competitive than women. STEM fields are structured to be a more competitive, and if women do not align with that mentality due to gender stereotypes regarding competitiveness, they might stay away from those occupations.

Gender stereotypes play a large role in this, and the psychology of stereotypes, specifically the stereotype threat, is another notable concept. Stereotype threat is “a situational predicament in which individuals are at risk of confirming negative stereotypes about their group... resulting [in a] sense that one might be judged in terms of negative stereotypes about one’s group instead of on personal merit” (Inzlicht & Schmader, 2012). In this situation, women might avoid pursuing technical degrees or careers due to the negative stereotypes regarding this career choice. There is the idea that pursuing this passion could shed a negative light on them. One such stereotype is that engineering and technology are masculine fields, and this continues to prevent women from entering this field. Stereotype threats, coupled with implicit biases, can adversely affect women in these fields. Implicit bias is “the unconscious attribution of particular

qualities to a member of a certain social group” (Inzlicht & Schmader, 2012). An example of these biases in action can be seen in this scenario; a female student taking a math test in a room full of men. This female will experience an extra cognitive and emotional burden of worry related to the stereotype that women are not good at math. Even the subtlety of not seeing any other women in the examination room with her will unfavorably affect her test performance.

These stereotypes are heavily perpetuated in film through the lack of representation for women in these arenas coupled with the large focus on men in these fields. Usually in these films, the men are the main characters and they end up being the most intelligent and/or the heroes for purposes of the plot. This however inadvertently sidelines the female character featured, potentially making the audience subconsciously feel she is inadequate for the job at hand. These stereotype threats and implicit biases are types of messages that women and society receive regularly and could be another reason society is not seeing women in the technology industry. This prescriptive gender stereotyping deters women from engaging in agentic behavior such as competitiveness or assertiveness, as it those are considered masculine qualities and women would rather not identify with masculinity. Overall, the categorization of competitiveness as a stereotypically male quality has led to female aversion to that trait and activities or occupations that would support it.

Counter to the male stereotypes that women might avoid fulfilling, female gender stereotypes can also play a part in their occupational decision making. Generally, women are stereotyped to be more “caring and committed to the welfare of others,” as the more communally minded members of society (Buontempo et al., 2019). One example of this is seen in the gendered media representation of women in maternal roles. The communality prescription of women serves to maintain the patriarchal structure of society, as women are depended upon to

manage domestic lifestyle and fulfill romantic roles for men (Rudman & Glick, 2001). Historically, this problem is two-fold as women are typically called upon to be homemakers, and women also tend to hold lower level positions in structures of hierarchy. As an experiment noted, homemakers are perceived to be high in communion and low in agency and the differing distributions of women and men into the roles of homemaker and employee may account for the stereotypic beliefs that women are more communal (Eagly & Steffen, 1984). From this, women are generally “discouraged from advancing their interests at the expense of others or from activities that threaten... the well-being of others” (Spence & Buckner, 2000). These stereotypes deter women from entering especially the more mechanical STEM fields, where we see the largest disparity in gender, as those do not lend themselves well to stereotypically feminine attributes such as placing the community ahead of oneself.

Although competition itself is not entirely negative as it can be used to invoke better and more effective results, the competition in this industry affects women in toxic ways, making it a larger issue. For women who choose to enter STEM fields, they must subscribe to the stereotypes and exhibit agentic qualities such as masculinity, for which they may be rewarded in competency ratings, but they will suffer social consequences such as discrimination. Conversely, if women act as feminine stereotypes prescribe them to, they will be passed over for leadership and further intellectual opportunities, being deemed unfit for the roles. This is known as the backlash effect, which is defined as any “social and economic reprisals for behaving counter stereotypically” (Phelan & Rudman, 2008). Thus, women are stuck, as they can engage in communal behaviors that are stereotypically feminine, and be liked but not respected, or enact agentic behaviors that are stereotypically masculine, and be respected but not liked (Rudman & Glick, 2001).

Representation

Competition is perpetuated by the underrepresentation of gender diversity in society, specifically in film. In films concentrated on STEM or technology, the cast is usually male dominated with only one or two women in secondary roles. In the past decade, of all the STEM characters found in films men outnumbered women almost two to one, where men held 62.9% of the roles while women only held 37.1% (Davis, 2019). This underrepresentation reinforces the idea of competition, as it perpetuates the notion that there is limited space for women in these realms since there are only a few females present in the scenes.

Specifically, women were less likely to be shown in engineering and technology-based roles compared to other STEM roles such as life sciences, with women only shown as engineers 2.4% of the time while they were shown in life sciences roles 65.8% of the time (Choueiti et al., 2014). Comparatively, men were shown in engineering roles 13.7% of the time (Choueiti et al., 2014). Women were shown in equal amounts to men in natural and life science-based STEM roles such as medical doctors or biologists between the genders. Medicine and natural life sciences are more community-based fields where the societal good is clearly visible. Girls from a young age are raised with a community-oriented mindset, which means they prioritize working with others and helping others (Diekman & Steinberg, 2013). The entertainment media continues to reinforce gender stereotypes such as these by portraying STEM women in these roles in a larger percent than math and computer science-based roles. However, the media tends to portray STEM majors as lone scientists, and this is misleading. Much of scientific and engineering work is communal and collaborative, and if this was more accurately portrayed in film the role incongruity would be less of an issue for women.

In film, men and women were shown to face adversity at the same rates, however women in STEM roles were shown to face sexual harassment and gender discrimination at higher rates (Davis, 2019). In the actual workplace, women in majority-male professions, such as STEM fields, report higher rates of sexual harassment and gender discrimination than women in other professions at a rate of 49% compared to 32% elsewhere (Funk & Parker, 2018). Research shows that this problem is pervasive even earlier on, as college-age women state that they are less likely to select a major if they feel they will face gender discrimination in that field (Cimpian et al., 2018). These women are not mistaken in their understanding or expectations, as up to 50% of women in STEM careers say they have experienced gender discrimination, and 36% of these women say sexual harassment is a problem in their workplace (Funk & Parker, 2018).

The assumed gender roles of men possessing agentic qualities, such as competitiveness and dominance, while women being stereotyped as submissive and community minded, can be seen through the gendered media representations. Furthermore, the lack of female representation in the media does not help as the visuals of women are minimal. The discussion of the films below will analyze the gendered media representations, specifically of women in STEM fields. A brief history and synopsis will be provided for each film, followed by a more detailed analysis on the contents of the film including characters, genres, settings, and their relations to one another.

Film Analysis

Annihilation

Annihilation (2018) is a science fiction horror film based on the 2014 novel of the same name by Jeff VanderMeer. Although the director, Alex Garland, was hired in 2014, principal filming only began in mid 2016. The film features an all-female main cast and was released in early 2018. It was slotted to be released in 2017, however due to poorly received screen testing

and concerns that the film was too intellectual and complicated, changes were made, including to the lead character. The film was altered to show Lena, the lead, as more stereotypically feminine, according to reports (Kit, 2017). The story follows a group of scientists, all from distinctive STEM fields, who enter and try to survive a mysterious realm of alien mutated plants and animals known as “The Shimmer”. Although the cast of *Annihilation* is all female, the film does not spend time highlighting their gender, and this insignificance is significant. The characters’ ability to work in cooperation with one another and lead a successful mission is not reliant upon their gender. As STEM fields are generally thought of as individualistic endeavors, *Annihilation* opposes this by portraying five intelligent women in STEM careers, working together for a greater cause.

The film opens with Lena, a cellular biology professor and a former U.S. Army soldier, as she is being interrogated after being the only one to return from an expedition into “The Shimmer”. “The Shimmer” itself emerged three years prior in Florida. Looking back, it is discovered that Lena’s husband Kane went on a mission into “The Shimmer” and was the only one in his group to return. He came back after being missing for a year and is now permanently disoriented and continues deteriorating as time goes on. Lena, worried for her husband, tries to take him to the hospital but is intercepted by security forces and taken to Dr. Ventress, a psychologist. Dr. Ventress is planning new venture into “The Shimmer” and Lena joins her along with three other women: physicist Josie Radek, geomorphologist Cassie Sheppard, and paramedic Anya Thorensen. The women enter “The Shimmer” and once they awake, they realize their communication devices do not work and they have no sense of time, as they do not remember anything after arriving. As time goes on, they encounter several mutant plants and animals; each member of the group dies off one by one except for Lena and Dr. Ventress.

Continuing on, Lena and Dr. Ventress head to the center of “The Shimmer”, a lighthouse where an explosion causes Dr. Ventress to disintegrate into a glowing nebulous structure. This globule absorbs a drop of Lena’s blood and transforms into an identical copy of her. Lena takes advantage of this and has it copy her suicidal self-destructive behavior, as she saw her husband do in a video left behind. The carbon copy Lena sets herself ablaze and the flames engulf the entire lighthouse, which proceeds to collapse the area, and “The Shimmer” fades away in its midst. Lena, the real version, is able to return to her comatose husband whose condition has rapidly improved since the disintegration of “The Shimmer”. However, when Lena asks Kane if it is really him he replies, “I don’t think so” and the film ends with Lena and Kane in an embrace, their eyes both shimmering.

The expedition team featured in the film consists of five women and it is made aware to the audience that this is the first group of women to enter “The Shimmer”. All of the previous expedition teams were comprised entirely of men, and no woman has ever even participated in one of these missions into the Shimmer before. “All women” Lena mentions as she takes stock of the individuals assembled around her, to which Josie promptly responds, “scientists”. Throughout the rest of the film, there is no mention of the fact that the team is all women or a constant highlighting of their gender. The audience is aware of the fact that the team is the first-female group to head into the Shimmer, but the story itself does not spend time commenting on the fact, which is important. The point is further made through the lack of a strong male presence in the film consistently otherwise, compared to *Black Panther* or *A Wrinkle in Time*, where the female characters are either supporting or supported by a male figure. In *Annihilation*, and similarly *Ocean’s 8*, the women are the focus entirely and the male characters are in the

periphery, and they are mostly unnamed at that. The women are capable of doing their jobs and their gender is not the focus.

By including a cast of all females, *Annihilation* pushes back against the concept of tokenism, which is regularly seen especially with gender inequality issues such as having women in STEM. Tokenism is the practice of making only a symbolic effort to complete a particular thing; in this case it would be hiring a certain number of women in these roles to fulfill a quota. This can be seen within films, where in a largely male dominated cast there will be one woman, usually in a lesser or more secondary role. This is also important to note for STEM fields, as it perpetuates the notion that STEM is a male dominated field and that women do not belong. In general, although tokenism seems to be a fix, as it includes women in the roles for the time being, it is only representational and therefore does not resolve the root of the issue. Women who are in place as tokens also feel extraneous pressure and stressors, as the feeling of representing all women is a burden they carry. The solution of tokenism is short term and minimal and does not translate well over longer periods of time as it is not instigating real change, just placing a bandage over the problem. As a film, *Annihilation* counters this soundly as it features five strong female leads, and that too all in the STEM fields. The actresses themselves noted that working on the film where they are not the only girl in the movie felt like a different experience, Natalie Portman who plays Lena stating “it's nice to feel that you're a character reacting to other characters, not a representative for your entire gender” (Natalie Portman, 2018). Furthermore, the importance of the characters all being female is known, but not dwelled upon. This removes the burden from their shoulders, as their success is a direct correlation of their individual stories, not trying to be representative of all women in STEM.

Fully developing the characters to have personalities and strong skill sets of their own also removes some of the stress from women to be representative of their whole gender, as they gain individuality. One example of this in the film is Josie, a physicist and one of two women of color in the film. Even initially, Josie takes the moment when they are all gathered to highlight their accomplishments rather than their gender which is an important call out, for the group and regarding her character's mindset individually. Tessa Thompson, the actress who portrays Josie, took this direction for her character specifically, wanting her to be a fully individual character that still contributes to the greater group cause. She worked deeply with and is highly vocal about the importance of parity and equity in Hollywood especially in the era of #MeToo. Thompson noted that "there's all these really harmful narratives designed to really diminish [the] collective power" of women, especially in regard to using their intellect (Tessa Thompson, 2018). Showcasing five strongly independent and intellectual women that use their STEM based skill sets for the greater good is important as it shows that STEM does not need to be a competitive field as it celebrates the collaborative efforts of the individuals. Furthermore, by having women as the focus, without placing undue emphasis on their gender or even their race, *Annihilation* shows that women are capable, not due to their gender, but due to their intelligence and interest in the STEM field.

Ocean's 8

Ocean's 8 (2018) is a heist comedy film, made as a continuation and a spin-off from the *Ocean's* trilogy. The original *Ocean's Eleven* (2001) and the subsequent features in the trilogy all starred an all-male main cast, which is a contrast to *Ocean's 8* which presents a decidedly all-female cast. The film went into production in late 2015, with the full cast meeting to begin filming in October 2016 and a final release date of June 8, 2018, exactly 11 years after the first

Ocean's Eleven was released. The film follows Debbie Ocean as she brings together a group of women to orchestrate a heist at the annual Met Gala. *Ocean's 8* is yet another example of women working together cooperatively, and a large contributing factor to their success was the female character that focused on technology. The character, 9-Ball, was portrayed as a cool and confident woman whose leadership and cross-functional efforts strongly contributed to the team's success. Stereotypically, many technology-based careers, especially hackers, are presented as lonely and dishonorable. However, *Ocean's 8* presented a woman with this technical skillset as a positive supporter of the group, contrasting that stereotype.

The film opens with newly paroled con artist Debbie Ocean as she convinces her friend and old partner in crime, Lou, to join her on the major heist she is orchestrating. After Lou agrees they proceed to gather their team for the mission: fashion designer Rose Weil; jewelry maker Amita; security hacker and technology wiz Nine Ball; street hustler and pickpocket Constance; and profiteer Tammy, who fences stolen goods out of her suburban home. All of these women have a reason and the skills to join Debbie on her raid of the annual Met Gala at the Metropolitan Museum of Art, where they plan to steal the Touissant, a \$150 million Cartier necklace off the neck of Daphne Kluger, a movie star and their unknowing accomplice. The team tricks Daphne into hiring Rose as her designer for the Met, which gives them access to scan the Touissant necklace owned by Cartier. While Amita creates a replica of the jewelry, they realize that the necklace can only be unclasped by a special magnet, so Nine Ball and her younger sister create a duplicate magnet to be used on it. Taking this to the gala, through several tricks and maneuvers, the team is then able to successfully smuggle the necklace out from the event. It is then revealed that Daphne was also in on the plan, and the team proceeds to pin the theft on

Claude Becker, an art dealer who betrayed Debbie in the past. The group of women split the spoils of their successful mission and go their separate ways.

As a film with eight female leads, even prior to its release *Ocean's 8* received a lot of attention lauding it to be a great feminist work. As with *Annihilation*, the full-female cast is a strong counter to the assumptions of tokenism. Even after its release the film earned glowing reviews for the most part, but not without comparison to its all-male predecessors. The film follows in the footsteps of another gender-swapped remake, the all-female version of *Ghostbusters* (2016). The *Ghostbusters* remake was not successful, as it was met with a bombardment of sexist and racist commentary in the form of bad reviews. This was largely attributed to the fact that the main fanbase for the *Ghostbusters* fantasy franchise was male and as the original came out in their adolescence, they had formed strong attachments. The 'feminization' of the *Ghostbusters* franchise was met with disdain as the fanbase had rendered the franchise untouchable. Thus, when *Ocean's 8* was announced, there was a lot of concern as to whether the film would be met with similar reactions. However, one thing that saved *Ocean's 8* from an analogous fate to *Ghostbusters* is that the *Ocean's* franchise does not have as strong a fanbase, plus the successors were released in closer proximity to one another. Overall though, both films call into question the need for female remakes rather than developing new and original stories. All four films analyzed in this thesis are either female reboots, similar to *Ghostbusters*, or adapted screenplays from previous works. This calls into question why the development of new and inventive stories that feature women at the forefront is not prominent. Olivia Milch, one of the film's writers and producers, noted that "the hope is that we get to a place where there's just a lot of movies being made with female protagonists and female voices," but for now using a known entity is a good entry point for that (Velasco & Chiriguayo, 2018).

A study looking at the top 100 grossing family films in the last decade found that male leads outnumbered female leads two to one, showing how the film industry has not fully embraced and given equal opportunity for female leads (Davis, 2018). *Ocean's 8* had eight strong female leads, all well-known actresses with impressive credentials, and there was still a question of its success. Questioning an achievement when women are the face of it is problematic, especially when there are already less opportunities for women to shine. Placing extraneous pressure on females to achieve, in any realm including STEM fields, because of their scarcity, is not fair. Individual achievements or failures of women should not represent the entire gender, but in its current state that is the issue. For example, if *Ocean's 8* was to have flopped the blame would have been placed on the fact that it was an all-female cast, not on the male director or on the movie goers who maybe refused to support the film. Furthermore, this notion would have been perpetuated by the fact that the previous *Ocean's* franchise movies, led by all-male casts, were successful.

Not only is this film the only one to be a reboot, but it is also the only one analyzed in this thesis that is set in full reality. The other films have some element of fantasy or mysticism about them, whereas this one places its characters in reality where their heist takes place at an event that actually occurs annually. Additionally, the Met Gala scenes feature real life celebrities, such as the actual Vogue editor and Met Gala host Anna Wintour, which further places the setting of the film firmly in reality. This has an effect on how the characters themselves are perceived by the audience, as everything has to be believable to an extent. In a film that uses fantasy some skill sets could potentially be explained away with unrelated methods but in *Ocean's 8* everyone's backstories, abilities, and contributions must be convincing.

Of all the characters in the film, 9-Ball played by Rihanna was the only one that displayed technical skills in regard to STEM. Furthermore, she is only one of three women of color in the main group of eight. Specifically, regarding her skill set, she is a master hacker with strong technological prowess, hired in particular to control the Met Gala security system during the heist such that the team does not get caught. At her introduction, 9-Ball is shown to be able to hack any system, and proves this by hacking and controlling the lights in the apartment building their headquarters is in. She then proceeds to smoke some weed while at the interview and insists everyone call her 9-Ball without revealing her real name, even when she is told everyone else uses their real name in the team. Hacking has a cultural connotation of technological mischief, even criminality, and in this case that is apt as 9-Ball is joining a team for a heist (Thomas, 2002). However, 9-Ball's representation as a hacker along with the smoking and secrecy with her name shows an extra layer of mystery that the others in the film do not possess. This, along with her contribution at other points and the higher-level association in the heist, highlights her character and the skill set she brings within the film.

She also assists in implementing other technologies, such as the camera scanning glasses and the magnetic lock, for which she receives support from her younger, equally intelligent sister. Each of her contributions is collaborative with at least one other member of the team and assists them in their role, such as setting up the 3-D printer for Amita to recreate the decoy jewels. Later in the film it is seen that 9-Ball is the only one that does not enter the Met Gala for the most part, rather keeping a bird's eye view on the security cameras from the stakeout truck. This undertaking further places her in a position of leadership within the team and shows the importance and value of her technical skill set to the group's goals. There is a typecast of STEM careers to be of nerdy men working alone, in a lab or on a computer, by themselves (Cheryan et

L., 2013). 9-Ball's character is the antithesis of this, she is a confident female working in a group of different professions and paths, contributing to the greater cause in a productive and significant way. Her use of her skills for the betterment of the group's goals shows how technological knowledge can be used in a way that services the communal greater good, which STEM careers are stereotypically shown not to be.

A Wrinkle in Time

A Wrinkle in Time (2018) is a science fantasy adventure film based on Madeleine L'Engle's novel of the same name (1962). This film is the only one highlighted in this thesis that is directed by a woman and is the first \$100-million-budget live-action film to be directed by a black woman (Cruz, 2017). In a study done on the top grossing films of 2018, the portrayals of women were more positive in movies directed by women (Kunsey, 2018). Ava DuVernay, the director, signed on to direct the film in early 2016, with filming starting late 2016 going into late 2017. The movie was released in February 2018, and although it was a box office bomb, many critics "celebrated its message of female empowerment and diversity" (Chuba, 2018).

Individuals have cited the inspiration they drew not only from the original novel, but from the movie as well, stating that having "a girl character being treated as if her take on what was going on around her, her analysis and her emotional reactions to the things that were happening around her, were real and were worth paying attention to" was instrumental (Duane, 2018). This is attributed also to the confidence that Meg possesses throughout the story, as she trusts in her intellect and pushes back to prove her abilities.

Meg Murry is a biracial, middle school student who lives with her mother and younger brother Charles. She is a bright girl that has recently been struggling in school after the mysterious disappearance of her father. Her father was studying astrophysics regarding the topic

of teleportation, the existence of other worlds in our realm, and the question of humanity's existence. Their father, Alex, was working on a type of space travel known as the tesseract and Meg and her mother both believe he solved this which transported him to another world. One evening, Charles invites Mrs. Whatsit, an astral being, into their home where she reveals that the tesseract that their father had been working on was real. This confirms Meg's suspicions on her father's whereabouts, and along with Charles and her classmate Calvin, Meg meet with Mrs. Whatsit, Mrs. Who, and Mrs. Which, three astral travelers known as the Misses. The Misses lead the kids to another planet through a tesseract. They continue to voyage through various planets searching for their father, encountering a variety of supernatural beings that help and hinder them. Finally, Meg, Charles, and Calvin come upon the planet Camazotz where Alex is trapped but Charles becomes possessed by a dark shadow. After almost sacrificing herself and declaring her love for her brother, Meg is able to free Charles, and the rest of the planet, from the bind of the dark shadow. The Misses then congratulate Meg on her successful mission, deeming her a warrior. The kids and Alex tesseract back home to Earth and the family is reunited.

The title, *A Wrinkle in Time*, describes the concept of tensegrity structures which can be transformed or "wrinkled" to demonstrate the movement of geometric objects through space. Even at the beginning of the film, Meg is shown to be intelligent and capable as she explains this concept to her male peer, schoolmate Calvin. Having a young girl rationalize a seemingly difficult theory to a male peer is significant especially for younger viewers. In general, it has been discovered that girls tend to raise their hand in class less compared to their male counterparts, even if they know the answer, and this is exponentially more evident in STEM classes (Degol & Wang, 2016). This could be attributed to the stereotyping of math and science-based subjects being more for boys, or the stereotype of boys being better at these topics

compared to girls. Independent of age, male participants of a study reported that their own gender group “should” be good at STEM while female participants stated their group “can be” successful in these fields (McGuire et al., 2020). In addition, there are broad cultural stereotypes that categorize various STEM field as unsuited for girls, such as ones that argue “Math is for boys” (Cvencek et al., 2011). These, alongside the stereotypes of STEM being competitive and exhibitivite of non-feminine qualities, tend to push girls away from demonstrating the knowledge or pursuing the interests they have in STEM fields. However, having Meg not only show interest and capability in STEM but also display that to her male classmate is advantageous in battling the stereotypical conceptions against such behavior.

The ideology that young girls are not meant for STEM is further pushed by the societal notion that girls must ‘play dumb’ in order to impress and not intimidate boys, which is a notion that Meg does not adhere to in this film (Pereira, 2014). The strong pressures of gender norms in society are inclined to dictate the behaviors and choices of young people, one of those being the dominance of men to be stronger, smarter, and cleverer than women. Young girls play into this stereotype due to the societal pressures they face by downplaying their abilities, especially in order to gain attention from their male counterparts. In *A Wrinkle in Time*, Meg does not downplay her intelligence and is in fact encouraged, especially by the Misses, to do the opposite and have confidence in her abilities. One example of this comes when Meg and Calvin are being chased by a large storm and come to a dead end when they run into a huge wall. Meg asks Calvin to trust her as they throw themselves into the eye of the storm winds so the force can take them over the wall to safety. When asked how she knew to do that, Meg casually responds that it’s a “physics thing, classic slingshot maneuver”. Calvin replies in astonishment at her abilities, “you are incredible”. In this scene, it is not only the fact that Meg saved them with her knowledge and

courage that is empowering but the support from her male peer is also crucial. Displaying that support is vital as it tackles the stereotype of asserting male dominance from both ends. One, from the perspective of girls who should not downplay their abilities to impress others or for fear of being thought of as less feminine. Furthermore, showing that trusting a girl in her capacities does not make the boy weak is also important in targeting the gender stereotypes for the rest of society.

Black Panther

Black Panther (2018) is a superhero film set within the Marvel Cinematic Universe based on the comic book character of the same name. The Black Panther as a character was introduced back in July 1966 by Marvel Comics, and interest in making it into a film was expressed as early as 1992. The project was not picked up by Disney and Marvel Studios until 2011, and director Ryan Coogler was only hired in 2016 to begin work on the film. This places the film directly within the time frame of societal events previously discussed. Although the story follows T'Challa, the king of Wakanda, on his journey to protect his throne, one cannot help but take notice of all the strong female characters present in the film, namely Shuri, T'Challa's younger sister. As the technology lead for the country, Shuri possesses great intellect and is presented as a funny and confident young girl. Her portrayal as such is important, as it shows a female character being unapologetic about her abilities while not being dominant and competitive, which are qualities that are stereotypically attributed to individuals in STEM fields.

The film opens by introducing five African tribes all at war over a fictional precious metal known as vibranium. One of the warriors ingests the metal by way of plant and obtains superhuman abilities, becoming the first 'Black Panther'. He then proceeds to end the war and unite all but one of the tribes to form the, again fictional, nation of Wakanda. Over time,

Wakanda becomes one of the most technologically advanced nations, however they shield themselves to protect the secret of vibranium and their advancements from the rest of the world. In the present day, the current Black Panther, T'Challa, returns to Wakanda to assume the throne alongside Okoye, Nakia, Ramonda, and Shuri, four of important women featured in this film. After beating a challenger to the throne who questions the royal family's contributions to Wakanda, T'Challa is coronated. He then embarks on a mission alongside Nakia and Okoye, with the assistance of Shuri, to stop the trade of some stolen vibranium. The mission is unsuccessful, and they are forced to return back to Wakanda with an injured ally from the outside, CIA agent Everett Ross. Ross suffered from a bullet wound to the spine, and while Shuri heals him, T'Challa discovers the culprit behind the stolen vibranium is a long-lost cousin of his. Erik Killmonger grew up in the United States and after the murder of his father, T'Challa's uncle, Killmonger became a black ops soldier. He trained his entire life to one day return to Wakanda and challenge for the throne, which he does. He beats T'Challa and temporarily secures the throne, but eventually loses in the larger battle against the other united tribes of Wakanda. The film ends with T'Challa establishing an outreach center in the United States, to be run entirely by Nakia and Shuri.

It is important to note the cultural significance of *Black Panther*, as the film has been called “a love letter to black culture” in its celebration of the black community through its depiction of Wakanda and its people. The story is a shift from ones historically told in Hollywood with African American individuals. African Americans are typically pigeonholed into very specific roles, ones that typically are layered within a larger picture of white people. *Black Panther* tells the story of an entirely black narrative rather than providing just a glimpse and leans into the concept of Afrofuturism to do so. Afrofuturism is an idea that in the future,

black people will not only use technology and science to exist, but to thrive (Marco, 2018). The whole film setting is established under the guise of an idealized world, as fellow director Ava DuVernay says “Wakanda itself is a dream state” (Ava DuVernay, 2018). DuVernay herself uses the concept of Afrofuturism lightly in her film *A Wrinkle in Time* (2018). Furthermore, Marvel movies and superhero films in general take place against grandiose backdrops that are from the far reaches of one’s imagination. Thus, through the use of Afrofuturism and speculative fiction of the Marvel Universe, *Black Panther* creates characters that are full developed, self-realized, and thriving, especially the female personas.

There are several strong female characters present in the film, and although they are secondary characters their presence is pervasive throughout the story. Ramonda and Nakia both serve as confidants and strong voices of reason to T’Challa, while Okoye is the leader of the Dora Milaje, Wakanda’s all-female special forces and the royal bodyguards. Shuri, arguably the most important in the film, is the younger sister of T’Challa, and she is the leader in designing new technology for Wakanda. She is the mastermind behind all the innovative and astounding technologies that place Wakanda head and shoulders above the rest of the world. According to Leticia Wright, the actress who portrays Shuri, “she has an innovative spirit and wants to take Wakanda to a new place” (Leticia Wright, 2018). Furthermore, Ryan Coogler wanted to place Shuri as the leader of the technological revolution because he thought it would be interesting to see a young girl “who’s manipulated [vibranium] in ways that nobody else could, . . . who’s confident and able to have her own space” (Ryan Coogler, 2018). Shuri was selected specifically to be a role model for young girls and promote their interests in technology, portraying it in a light that is powerful due to her effect on and contributions to the story.

Shuri's first scene in the film is as T'Challa is returning home, and Shuri is there with her mother to greet him as he comes off the flight. She asks how the technology she designed for him was working, and immediately mentions that she has some updates for it. T'Challa teases "you are teaching me, what do you know" to which Shuri promptly responds, "more than you". Having this confidence in her abilities is an important trait that is not often seen with women in STEM fields. In general, women tend to undersell themselves in their achievements compared to men. A study done on scientific articles written by men and women showed that women are 21% less likely to use positive terms to frame their findings paralleled to men in a similar position (Jena et al., 2019). This typically underselling behavior could be partially attributed to the fact that boasting about oneself is self-advantageous and therefore not communally minded, which based on societal norms placed upon women is not a feminine trait. Women are socialized to make sure everyone around them is comfortable and being perceived as boastful or conceited is not in line with that. However, Shuri is not presented as prideful in a negative light, her attitude in this scene comes across as confident. Her portrayal as such is important as it shows that girls should not be afraid to speak their mind and display their intelligence, even to their male counterparts.

Even though Shuri is confident in her abilities and proves time and time again her rightful place as the leader of technology in Wakanda, she is questioned by a few skeptical people around her, specifically older male figures. For instance, when T'Challa is contested for the throne, M'Baku, the challenger, states one of his biggest qualms is that Wakanda's greatest assets, the technological advancements, have been entrusted to a child. Another example is when CIA agent Everett Ross wakes up in Wakanda after being shot in the spine and subsequently healed by Shuri, he can hardly believe it and proclaims his recovery to be through the use of magic. Shuri

replies, “not magic, technology”. When Ross is initially brought into her lab, Shuri is delighted at the prospect of being able to fix “another white boy,” as we see in a post credits scene Shuri helping another MCU character, Bucky Barnes, with an issue, his brainwashing from the Cold War. This problem has stumped many before her, with no solutions having been found up until this point. Taking a look at the larger picture, *Black Panther* sits as the 18th film in the Marvel Cinematic Universe. In this huge realm, Shuri’s character can be placed as one of the smartest alongside the other great intellects in this superhero universe, namely older men. Shuri however continually proves the doubters of her intellect wrong, through her position as a leader in her field and is pictured to be having a good time doing so.

Showing Shuri as a fully actualized character that is thriving not only in her occupational pursuits, but in her personal relationships and identity is important as it counters the cultural stereotypes placed on girls in STEM. The idea that STEM fields specifically in technology do not provide the outlet for creativity and socialization is reinforced through educational pipelines and the media, however *Black Panther* counters this with Shuri’s character (Root-Bernstein, 2015). Shuri is portrayed as a funny and fashionable girl, who cares about her family and the betterment of her country. Her character is a productive counter to the cultural stereotype that STEM fields are isolating and non-communal, providing little benefit to society. Arguably one of the most important characters in the plot, Shuri designed the suit that T’Challa wears that assists him in beating Killmonger as well as creating countless other inventions that support the success of Wakanda and its people. At the end of the film, T’Challa, who has been hiding the secrets of Wakanda’s advancements, realizes that the way forward is by sharing the knowledge they have as a country, a lot of which comes from his sister. This is promoting a non-competitive view of STEM, and especially with women at the forefront of it. Traditionally STEM has been perceived

as competitive and thereby, stereotypes predict it to be male driven, and here this is not the case. T'Challa notes that it will take a person that is equally sharp and compassionate, such as Shuri, to responsibly take this technology out into the rest of the world.

Conclusion

Women in STEM, and in particular technology roles, have minimal representation in the industry as gender discrimination is prevalent and pervasive. This is visible in the media portrayals of women in these fields as well, albeit those are quite minimal. The lack of female representation in media was especially called into question after the events of 2016, including but not limited to the United States presidential election and the rise of the #MeToo movement, especially in Hollywood. Thus, the films released in 2018 are a by-product of the cultural setting they were forged in. The four films that were selected for this study, *Annihilation*, *A Wrinkle in Time*, *Black Panther*, and *Ocean's 8* were all released in 2018 and feature a strong female character working in the realm of STEM. Through the analysis of the four films in this study, there are a few more notable similarities and themes that come across the span of media.

All the storylines, namely *Annihilation* and *A Wrinkle in Time*, are fueled by men. Although the story focuses and highlights female leads, men are the catalysts for their adventures. In *Annihilation*, Lena, a strong scientist in her own right, is set off on her journey into "The Shimmer" after her husband returns weakened from its effects. Likewise, in *A Wrinkle in Time*, Meg, a strong science student herself, is emboldened to go after her father who disappeared to another dimension. These two films are the strongest examples of men instigating the plot for the female leads however it is present in the other two films as well. *Ocean's 8* does not feature a male catalyst, but Debbie Ocean, the leader of the group, is presented as the main character because she is the sister of Danny Ocean who was the main role in the earlier part of

the franchise. Although this is less prominent than the other male roles, it is still important to note that the premise of the story lies with the female lead's relation to a stronger male figure. Lastly, *Black Panther* presents Shuri as an extremely capable and intelligent character, but she is a secondary character in place to support the storyline of two male leads. This does not diminish her strength or value as a character, as she is an extremely robust role model, and this goes for the other characters as well. The plots, although stimulated by male characters, are following the arcs of the female characters for the most part. Furthermore, the female characters are self-actualized, fleshed out, full beings who are not being stereotyped to society's conceptions of gendered media. Overall, all the films do feature these smart women as leaders in their own right, but the fact that their greatness is rooted in a storyline driven by male characters is notable especially in an industry where gender representation is not equal.

Another inequality present in the film industry, and in STEM fields, is racial inequalities. It should be noted that all the female characters in the films focusing on STEM roles were women of color: Josie in *Annihilation*, 9-Ball in *Ocean's 8*, Meg in *A Wrinkle in Time*, and Shuri in *Black Panther*. It is unclear what instigated the casting of these women specifically for all the films. The concept of tokenism might be the reasoning behind the casting choices in *Annihilation* and *Ocean's 8* as the women of color are one of few in the larger ensemble cast. The story and the characters in *A Wrinkle in Time* come from a novel, however race was not specifically identified in it. Previous iterations of the film featured white actresses playing Meg, therefore the casting choice of a young black girl was pointed. This could have to do with the fact that the film's director, the only female director of the set, is a black woman herself and has spearheaded many efforts in Hollywood to increase diversity. *Black Panther* is a film rooted in the idea of representing a strong black cast, especially with the location being set in Africa, therefore Shuri's

race was predetermined. However, this does not undercut the value she brought to the story of the Marvel Cinematic Universe as a whole.

Presenting the female characters as collaborative in their pursuits and confident in their abilities was another common theme across the films, which is especially important in combating the misconception that STEM fields are competitive and therefore, not for women. The societal stereotype that competitive fields are masculine deters women from entering the field as they do not want to be perceived as such. The films in this study present the STEM field and the individuals in them as positive contributors to the greater good or the communal cause.

Annihilation shows five women in STEM working together in a collaborative manner while *Ocean's 8* highlights a technology wizard supplying knowledge and leading a team of women towards their goal. Furthermore, the films also set forth the notion that dominance, another stereotypically agentic masculine quality, does not have to be as such and can still be used positively. In *A Wrinkle in Time*, Meg saves the team with her intellect, showing confidence and assurance in herself. Shuri in *Black Panther* is seen from the get-go as a confident and assertive character, but this does not make her less likeable or appealing. Later on, she is also seen distributing her knowledge for the greater good of Wakanda and the world, which shows how technology fields can still be communally minded.

Through this study it has become clear that the media representation of women in STEM, and specifically those technology-based careers, is minimal but nuanced. Women are shaped by the stereotypes that society places upon them and these are perpetuated to them from a young age through various mediums such as film. With STEM fields, there is a societal stereotype that these fields are competitive, and one must assert their dominance to be successful in these realms. Stereotypical gender roles prescribe that men possess these agentic qualities, and

contrastingly women are stereotyped as submissive and more community minded. However, these four films portray female characters in STEM fields that are confident in their intellect and are still contributing to communal efforts. Although the amount of representation is still minimal, these films could signify a shift in how women in STEM fields are portrayed in the media.

Showing that women and girls can be successful in STEM paths, disregarding the stereotypical elements, is a beneficial step towards gender equality for women in STEM. Overarchingly, these films reflect a cultural moment that is encouraging girls and women to speak up and be confident in their abilities. As Hillary Clinton said, "to all the little girls... never doubt that you are valuable and powerful and deserving of every chance and opportunity in the world to pursue and achieve your own dreams" (Hillary Clinton, 2016). Hopefully this notion carries through media, the technology industry, and is pervasive to the other realms of society as well.

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