

Film Review

Hidden Figures

A Film by Theodore Melfi (2016)

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Author Note

The insights or views expressed in this review are those of the author. They do not reflect official policy or the position of those the author serves. The author has no conflicts of interest.

Introduction and Background

Hidden Figures is one of the most powerful films of our time as it brings together an enormity of issues that have long needed our attention for true social justice and human rights in American society. However, before addressing the specifics of the film itself, it is important to consider the socio-cultural issues that stand behind this inspiring piece of contemporary cinema. These issues are critically important for the fullest possible appreciation of this work of art.

It is well known that, throughout history, the evolution and development of the sciences has centered largely on the work of white men. Although this is true for both “hard” and “soft” sciences, “hard” sciences, such as mathematics, engineering, and computer programming, have experienced a much smaller influx of the work of women, let alone women of color. This severe underrepresentation of women of color in science, technology, engineering, and mathematics, or STEM, majors and careers has been called the “double bind,” due to the double oppression incurred by sex and race, as well as the third oppression of a chosen career in the sciences (American Association for the Advancement of Scientists, 1976).

Although there has been some improvement in this area since it was first discussed in 1976, there has been little sustained effort to increase the population of minority women in the field, outside of efforts targeted specifically towards women, and minorities (Ong, Wright, Espinosa, & Orfield, 2011). Ong, Wright, Espinosa, and Orfield’s extensive research, and synthesis of research in this area, on which this film review heavily relies, is presented in full in their article in the 2011 Harvard Educational Review issue reviewing the history and progress of the “double bind.” As is discussed in the article, such outreach efforts generally have a disproportionate influence on white women, as the “double bind” of being both a woman, and of color, creates a distinct experience from that of white women. This distinct perspective has the potential to provide novel answers to questions long puzzled by those historically dominant within these fields, especially to questions long left un-posed. Such an influence can comparably be seen in

the changes to law and policies that affect women disproportionately, such as those related to domestic violence, sexual assault, and employment discrimination, upon an influx of women into the legal field. In the STEM fields this potential extends to addressing issues of disparities among populations, and other equity concerns, related to the environment, health, and structural limitations towards access, which might otherwise go unexamined.

The underrepresentation of women of color in STEM fields has typically been dismissed as an issue of lack of interest or desire to pursue careers within them. For 9.9 percent of all science and engineering doctorates in 2006 to be awarded to women of color, when they comprise 16.4 percent of the population, due to a lack of interest, belies issues of structural access and support within institutions throughout an individual's academic career (Ong, et. al., 2011). Although there is great interest amongst women of color to pursue STEM degrees, there remains a large underrepresentation in terms of completion. The imbedded structure of academic and research institutions does little to assist the very real, daily experiences of facing two forms of oppression. Not only do women experience gender bias as STEM majors, as at least 61 percent of participants in one study did within the past year (Robnett, 2015), but women of color also undergo racialized treatment from their peers and faculty, which can reinforce the perception of STEM professionals as white and male, and therefore reduce their STEM self-concept, or ability to feel as a legitimate member of the field (Carlone & Johnson, 2007). The lack of supportive networks and mentors for women of color within said institutions is significant, as they can typically fall through the cracks of the STEM major-career pipeline, especially when they must engage in extra, unseen, work in order to gain acceptance from their male peers in the first place (Ong, 2002). The difficult nature of finding a sense of self, and worth, as a woman of color within fields where one's presence is not expected, let alone heavily supported, can indeed help explain the lack of women of color in STEM.

This should be an issue of major concern, not only for the sciences themselves, but also for the country at large. The success and growth of STEM fields are correlated with issues related to economic growth and national security (Ong, et. al., 2011). The greater the investment in STEM, especially with a long-term perspective, the greater the opportunity for societal changing advancements, as was seen during the Space Race, and highlighted in the film *Hidden Figures*. In today's United States there are two important demographic shifts that must be taken into account. First, as the majority of the national population growth is from non-whites, whites make up a declining share of the population. Second, within this non-white population, women attend college at a much higher rate. Considering the facts that women of color are the most underrepresented recipients of STEM degrees by share of the population, which is steadily increasing, and that lower shares of the population receive degrees in said fields compared to other developed countries, the United States is risking both its economic competitiveness and national security by not addressing this disparity.

Summary

Hidden Figures was released in theaters in late 2016, and nominated for three Academy Awards: motion picture of the year, best performance by an actress in a supporting role, and best adapted screenplay (IMDb, 2017). It is based off of Margot Lee Shetterly's book *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race*, published earlier the same year. The purpose of both is to present

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the invaluable efforts of three black women, Katherine Johnson, Dorothy Vaughan, and Mary Jackson, who helped win the United States the Space Race, and therefore a significant edge up in the Cold War. Yet their effect is to shine a light onto the, until now, unseen, yet inordinate, influence of women of color in STEM fields on the trajectory of growth, success, and power of the United States. Most significantly, the film presents history in a way that makes it visceral to the viewer, in ways that simply knowing the facts cannot. It portrays the story of three incredible role models for all young women and people of color, in a highly accessible and easily approachable fashion.

The film begins in 1926 with a young Katherine, the story's main protagonist, in White Sulphur Springs, West Virginia. An incredibly bright and gifted child, she is offered the opportunity to attend the most advanced school in the state for "colored" children, which would require her family to move and for her to skip numerous grades ahead of her age. This sets the foundation for the first of three major themes throughout *Hidden Figures*, that of systems of support. Without the strong encouragement of her parents, Katherine would not have been able to receive the best education possible for her at the time, and for her to reach her greatest potential. These support systems extend beyond our immediate families, to those of our peers and mentors. For Katherine, that includes her friends and colleagues Dorothy and Mary.

Fast forward to 1961 in rural Virginia, the three women are on their way to work at the National Aeronautics and Space Administration, but their car has broken down, and they are stranded on the side of the road. Here, the second major theme arises, of living with and overcoming discrimination, as a racist cop pulls over to investigate the problem. When he learns of their jobs, human "computers" at NASA Langley's Research Center, who help astronauts in the Space Race against the Russians, he immediately shifts gears to help them get to work. It is clear that their job requirements go beyond his understanding, as he is surprised such a significant agency would even employ black women. These human "computers," all women throughout NASA's history, perform complex mathematical calculations by hand; prior to the advent of machine computers capable perform these tasks at incredibly fast speeds. Not only were these women computers separated in terms of hierarchy from the men of the organization, in that they performed calculations for the male engineers and scientists, the computing groups were themselves segregated by race.

Dorothy, the de facto supervisor of the West Area Computing Group, or black computing group, experiences discrimination from multiple sources throughout the film, from the hierarchy of NASA, as well as society at large. Octavia Spencer was nominated for an Academy Award for her role as Dorothy. Her manager, a white woman who calls Dorothy by her first name, but is addressed as Mrs. Mitchell in return, insists it is the powers at be who will not promote Dorothy and provide her the pay for the supervisor position she has effectively been working without the additional income. It is through a combination of the film's three themes, systems of support, overcoming discrimination, and unstoppable determination that Dorothy fights to reach her fullest potential and continue to maintain the highest level of achievement possible. From her relative position of power, Dorothy assigns Katherine, Mary, and all members of the West Computing Group, to the positions most fitting for them and the greatest potential for success.

Katherine, who is stunningly portrayed by Taraji P. Henson, is chosen to go to the Space Task Group to do analytic geometry computations, assist and check the numbers of the engineers in the group, and ultimately calculate the trajectories and landing coordinates for John

Glenn's Friendship 7 mission to orbit the Earth. She is the first person of color assigned to the Space Task Group, and immediately senses the amount of pressure this entails. She is told not to embarrass Mrs. Mitchell, is mistaken for a janitor, and is told "your bathroom" is not within the building, let alone the East side of the Langley campus. Katherine must run a half mile back to the West Computing Group, wearing heels and a skirt below her knees, which translates to 45 minute long breaks to use the restroom. The lead engineer does not trust her with sensitive information, and requires that she check his calculations with a large portion of relevant information censored from the page. After using the communal coffee pot for the first time, the next day her white co-workers have "conveniently" provided her with her own pot, labeled "colored," which they have not plugged in or brewed. It is Katherine's brilliance, determination, and perseverance that ensured her success within the position, as well as that of the overall Space Task Group's mission of determining landing coordinates and proper trajectories. She holds the paper to the light and is able to make out some of the censored numbers, and is therefore able to solve the puzzle evading the top engineers of the group. Katherine repeatedly insists that her name should be on the byline of the written reports, even though it is not standard practice for computers to author reports, and makes known that her presence is necessary in the top secret meetings in order for John Glenn's landing coordinates to be as accurate and up to date as possible, despite there being no protocol for women attending such meetings with the Joint Chiefs of Staff. She was successful in achieving both feats of being the first woman, to receive credit as an author, and to attend such a meeting.

Mary, who is played by Janelle Monáe in her second role of the year to receive high praise, the first being *Moonlight*, which won the Academy Award for Best Film of the Year, is assigned to assist the engineering department. The department is struggling to determine how best to build the capsule for the Friendship 7 mission so that it can withstand massive wind and heat upon reentry. Rather than build a new shield, Mary suggests that they use different fasteners for the same panels, to which her new "boss" responds that she should also be an engineer. However, Mary muses that this is not a realistic possibility, as she is a black woman, and therefore not allowed to attend most engineering programs. Her "boss," a white Jewish man, responds that if it is possible for him, a Holocaust survivor, it is possible for her, as well. Not only does society believe that she as a woman, and a person of color, is unable to be an engineer, her husband initially also believes it is beyond what she should attempt. Despite these obstacles, the support of her friends and encouragement from her "boss" motivates her to bring suit in order to attend evening engineering classes at the local, all white, high school. She inspires the Judge hearing her case to think towards history, how he will be remembered, and what will make him the first, like Alan Shepard to reach space, or her to attend classes at an all white school in Virginia, and ultimately wins the support of the Judge and her husband.

Understanding what was to come, Dorothy realized the lack of job security she and her fellow human computers would have when a new IBM 7090 electronic computer arrives and is assembled at Langley. In order to secure her position, and that of the West Computing Group, she decides to learn the computing language FORTRAN. To do so, she takes her children to the library to find a book on the language, which happens to be located in the white section. Dorothy is redirected to the "colored" section by a librarian, and ultimately escorted out of the premises by security. She later reveals to her sons that she stole the book from the library, since it was not in that section, as is her "right" as a taxpayer. Ultimately, Dorothy not only learns FORTRAN, but also teaches the language to the entire computing group, who are later reassigned as data center staff. An incredibly revealing scene takes place between Dorothy and

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Mrs. Mitchell, where in the desegregated bathrooms Mrs. Mitchell apologizes to Dorothy for not making her a supervisor and says she does not hold anything against “y’all,” to which Dorothy responds, “I know. I know you probably believe that.” Later, Mrs. Mitchell makes Dorothy a supervisor in the Analysis and Computation Division, and addresses her as Mrs. Vaughan.

As the dramatic arc of the film follows the ultimate success of John Glenn’s orbit around the Earth, so it parallels the audience’s growth in understanding of the skills and contributions of Black women in STEM, in terms of the progress of both STEM, and the nation itself. This increase in appreciation for the contributions of Katherine, Mary, and Dorothy is elevated by the straightforward nature which the distinct experiences of being a woman of color, during the height of the civil rights movement, is portrayed in this film. Watching this film is truly an immersive experience, allowing the viewer to honestly attempt to empathize with the struggle of experiencing the double bind of being a woman of color, and the triple bind of being a physicist and mathematician, like Katherine, a mathematician and aerospace engineer, like Mary, or a mathematician and NASA’s first Black manager, like Dorothy.

Reflections

It is of the utmost importance to appreciate and recognize the ability of women of color to address issues in a unique and profound way, and to search for ways to ensure their continued contribution to, and leadership in, society at large, and the STEM fields. We must encourage implementation of programs to address concerns about the environment of academic and research institutions to encourage the retention of women of color, whether it be mentorship programs, peer support groups, or scholarships. Pipeline networks from K-12 through graduate school and job placement would likely be the most effective. Creating a positive STEM self-concept is easier at a younger age, and could likely be helped by watching *Hidden Figures* in the classroom. Despite any institutional or governmental policies that could be enacted to increase the proportion of women of color completing STEM degrees, it is within the ability of those currently in positions of privilege and power in STEM fields and programs to assist in placing women, and people, of color into leadership positions, and encourage their growth within the field. It is within each of our ability to listen to and raise the voices of women in color in each of our fields.

As is shown in *Hidden Figures*, the contributions of women of color in STEM to the success of the United States, both in terms of national security and economic growth, are invaluable. This film is a true accolade to their brilliance and fortitude in the face of multiple levels of oppression.

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Dorothy Vaughan, Katherine Johnson and Mary Jackson (l to r)