www.TLHjournal.com Literary Herald ISSN: 2454-3365
An International Refereed/Peer-reviewed English e-Journal
Impact Factor: 7.825

The Invisible Architecture: Analyzing Intersectional Resilience and Institutional Transformation in Margot Lee Shetterly's *Hidden Figures: The Untold Story of the African American Women Who Helped Win the Space Race*.

Dr. Elizabeth Zachariah
Assistant Professor
Department of English
St. Mary's College Manarcad
Kottayam.
elzaaniltk@gmail.com

Abstract

This paper examines Margot Lee Shetterly's *Hidden Figures: The Untold Story of the African American Women Who Helped Win the Space Race* (2016) as a key historical narrative that reveals the important roles of African American women mathematicians in the United States' success during the Space Race. The focus is on Katherine Johnson, Dorothy Vaughan, and Mary Jackson. The study examines how these women dealt with both racial and gender discrimination at the segregated Langley Research Center. The paper argues that while their math skills were essential for orbital mechanics, their real legacy lies in their resilience. They used the Cold War's need for scientific excellence to break down institutional barriers. This analysis examines the shift from human computers to digital systems and places Shetterly's work within the broader conversation about Civil Rights and equity in STEM.

Key Words: double jeopardy, strategic resilience, institutional barriers, Civil Rights, STEM equity.

For decades, the story of the Space Race, centered on White male astronauts and engineers. Margot Lee Shetterly's *Hidden Figures: The Untold Story of the African American Women Who Helped Win the Space Race* (hereafter *Hidden Figures*) addresses this historical oversight. It details the lives of African American women who worked as human computers at NASA's predecessor, NACA. These women faced the burden of Jim Crow laws while providing essential trajectory analyses and engineering data for Project Mercury and the Apollo missions. This paper will explore how Shetterly uses these biographies to show that the Space Race was won not only through physics but also through a steady, quiet fight against institutionalized prejudice.

Margot Lee Shetterly is a talented author and entrepreneur. She transitioned from a demanding career in investment banking at J.P. Morgan and Merrill Lynch to become a prominent voice in nonfiction. She grew up in Hampton, Virginia, with a NASA scientist father and an English professor mother. This upbringing in a community of African-American leaders in science and technology inspired her New York Times bestseller, *Hidden Figures*. Before she gained fame as a writer, Shetterly lived in Mexico for several years, where she co-founded the

magazine *Inside Mexico* and served as a media consultant. Her thorough research into the human computers who advanced the U.S. space race has earned her numerous awards, including the NAACP Image Award and the Anisfield-Wolf Book Award, as well as an honorary doctorate from Worcester Polytechnic Institute. Through her writing and the Human Computer Project, Shetterly continues to highlight the crucial contributions of women who were key to NASA's early missions.

The central figures in *Hidden Figures*, Katharine Johnson, Dorothy Vaughan, and Mary Jackson, faced a unique mix of marginalization. In the 1940s, Dorothy Vaughan, a mathematics teacher and mother, joined the National Advisory Committee for Aeronautics (NACA) at the Langley Memorial Aeronautical Laboratory. Despite her qualifications, she worked in the segregated West Area Computing unit, where Black women were isolated from their White colleagues and subjected to daily humiliations, including cafeteria signs that read Colored Computers. Dorothy eventually became the first Black supervisor at NACA, teaching herself and her staff the FORTRAN programming language to stay relevant as the shift from human computers to electronic IBM machines took place.

Mary Jackson and Katherine Johnson joined her soon after, navigating a world where their professional skills often encountered systemic racism. Encouraged by engineer Kazimierz Czarnecki, Mary fought to attend segregated night classes at a White high school to earn her engineering credentials. Meanwhile, Katherine's expertise in analytical geometry earned her a position in the Flight Research Division. Although she initially faced social exclusion and was barred from attending editorial meetings, her determination led her to become the first woman in her group to be credited as an author on a research report.

The Space Race began in 1957 with the Soviet Union's launch of Sputnik, transforming NACA into NASA and heightening the need for women's specialized skills. Katherine Johnson played a crucial role in Project Mercury, famously performing the manual trajectory calculations requested by astronaut John Glenn before his orbital flight. Even amid the ongoing Civil Rights Movement and local resistance to school integration, these women broke through barriers by proving their value in mathematics.

The story peaks with the Apollo 11 moon landing in 1969. While activists criticized the mission for diverting federal funds from domestic poverty, the women behind *Hidden Figures* remained committed to their scientific goals. Their contributions not only secured America's achievements in space but also challenged racial and gender hierarchies within the federal government. Katherine described their legacy as a series of skipping stones across a lake, each impacting countless lives beyond their own.

Unlike their White female colleagues, Black women were physically segregated within the West Area Computing unit. Unlike Black men in the labor force, they were often viewed as sub-professional, even though many held advanced degrees in mathematics. The Langley Research Laboratory in Hampton, Virginia, created a specialized team of female mathematicians to manage the vast data from wind tunnel tests. Several biases influenced this hiring decision. Women were seen as detail-oriented and better suited for the repetitive tasks of operating manual adding machines because of their smaller hands. Additionally, the agency could hire women at a

much lower cost than men. By assigning these tedious calculations to female computers, male engineers were free to focus on more advanced concepts and analytical projects.

In 1940, President Franklin Roosevelt issued Executive Order 8802, establishing the Fair Employment Practices Committee to prohibit racial discrimination by defense contractors. This was a significant victory, fueled by Civil Rights leaders such as A. Philip Randolph. By 1943, as World War II escalated, the Langley Memorial Aeronautical Laboratory began hiring African-American women as junior physicists and mathematicians to support the National Advisory Committee for Aeronautics (NACA). These recruits often graduated from historically Black colleges, such as Hampton Institute and Virginia State. Despite their impressive credentials, they still faced Virginia's Jim Crow laws and were confined to the segregated office known as the West Area. Although these women performed the same rigorous data analysis as their White counterparts, their work was essential to the growth of American aeronautics and to the U.S. success in the Space Race.

Shetterly shows how systemic racism at NACA worked against its own goals. By enforcing segregation policies, NACA created a stressful environment that limited Black employees' ability to reach their full potential, effectively undervaluing the expertise the agency desperately needed. Jean-Francois Lyotard discourses, a willed silence is not a crime, but it is a crime to impose silence on another, “A greater wrong is added to this injustice, since one who is banished, being prohibited from speaking, has no means to appeal his/her banishment” (216). Shetterly pointed out that this gap was evident in many logistical details. White computers benefited from dedicated commuter buses and on-site dormitories at Langley, while their Black counterparts had to arrange their own transportation and housing off-base. Moreover, Black women had access to only a limited number of colored restrooms, often far from their work areas. These institutional barriers forced Black computer professionals to expend significant energy overcoming basic daily difficulties just to succeed in their technical roles. Shetterly underscores the everyday yet significant humiliation of the Colored Girls' bathroom signs and segregated dining spaces.

> The Black female mathematicians who entered Langley in 1943 stood at the crossroads of major changes. Their intellect and aspirations contributed to what the United States would later regard as a significant victory. But in 1943, America was focused on urgent needs. Responding to the situation at hand, Butler decided to add to Sherwood’s long requisition list a metal bathroom sign that read “COLORED GIRLS”. (Shetterly 8)
>
> Shetterly emphasizes how systemic racism created a self-destructive environment within NACA, undermining the national progress it sought. Although the West Computers were among the country’s top scholars, holding degrees at a time when only 2% of Black women reached such levels, they endured a challenging dual existence. This systemic discrimination infiltrated all aspects of their lives, from segregated housing in Newport News and shameful public transit laws to a significant wage gap in which Black professionals often earned half as much as their White peers. The absurdity of Jim Crow Laws was especially clear in social situations, where women like Dorothy Vaughan were denied service in restaurants that willingly served German prisoners of war, suggesting that the American state valued enemy combatants over its own citizens. Even in the

intellectual setting of Langley, Black women faced internalized discrimination from White colleagues who refused to sit near them. This forced these mathematicians to expend valuable energy navigating hostile social norms. Yet one is sure of the fact that "the history of inequality is shaped by the way economic, social and political actors view what is just and what is not, as well as by the relative power of those actors and the collective choices that result" (Piketty 20). However, the eventual success of the Space Race proved that these biases were illogical barriers to growth. When John Glenn insisted that Katherine Johnson personally verify the orbital trajectories, and when Mary Jackson became the agency's first Black female engineer, it became evident that NACA had only hampered itself by stifling the potential of its most brilliant minds.

African American women at the NACA faced two main challenges: unequal pay and obstacles to career advancement. A notable example involved Henry Pearson, who refused to offer Katherine Johnson a salary commensurate with her significant technical contributions. Dorothy Vaughan, Katherine's supervisor, recognized the unfairness and took action to challenge the pay gap and advocate for the recognition Johnson deserved:

> "Either give her a raise or send her back to me," Dorothy said to Henry Pearson, sitting upstairs in his office in 1244. A Langley engineer in the old style, Pearson had graduated from Worcester Polytechnic in Massachusetts and started work at the lab in 1930. He was a keen golfer, a horn-rimmed glasses wearer, the epitome of the New England WASP. Pearson was not a big fan of women in the workplace. His wife did not work; rumor had it Mrs. Henry Pearson had been forbidden by her husband from holding a job. (126)

For Mary Jackson, questioning a senior engineer's data was not about pride; it was essential to her community. As an advocate for an underrepresented group, she carried the hopes of all Black women at NACA. After carefully reviewing her work, Mary showed that her calculations were correct and that John Becker had provided her with incorrect figures. This encounter highlighted that human error happens to everyone, regardless of gender, race, or status, disproving the idea that genius belongs only to a certain group.

Katherine Johnson also rejected the professional invisibility imposed on African American women, especially their exclusion from important editorial meetings. She recognized that these meetings shaped critical research and decision-making, so she persistently questioned the male engineers about her absence. Her determination was "like the trickle of water that eventually forces its way through rock" (181), driven by the belief that failing to complete her work would betray her confidence and that of her supporters. Her eventual attendance at these meetings marked a significant victory, proving her essential role in one of humanity's greatest achievements.

Through these stories, Shetterly highlights the unique double discrimination faced by Black women. While being a woman or being Black posed individual challenges, facing both at once was an even tougher battle. The experiences of Dorothy, Mary, and Katherine show that talent and intelligence are not determined by color or gender. Their success required dismantling deep-rooted biases and proving their value daily, ultimately demonstrating that their contributions were crucial to the country's progress.

The text offers a profound dual narrative. It chronicles America's journey to the stars while highlighting the internal struggles of Black citizens as they seek to reclaim spaces denied to them. The book traces a significant historical trajectory: from descendants of enslaved people who educated themselves and persevered to enter the American middle class and succeed in various professions. Yet this journey was marked by systemic barriers, as the book details the racial and gender discrimination Dorothy Vaughan, Katherine Johnson, and Mary Jackson encountered in workplaces, schools, and public facilities.

Gender bias initially kept Mary Jackson from taking engineering courses, based on the false belief that such fields were strictly for men. Professionally, these women often had to wait for male instruction, received little acknowledgment in research reports, and were excluded from high-level editorial discussions. Katherine Johnson's experience further illustrates this inequality, as she was underpaid despite her crucial contributions. Their intersectional identities being both Black and female created a unique burden, as society consistently undervalued their intelligence.

Ultimately, *Hidden Figures* shows that discrimination is a tool used to undermine minorities for the benefit of a few privileged individuals. By creating a pathway for their talent, Dorothy, Katherine, and Mary demonstrated that capability is not tied to race or gender. Their stories inspire those marginalized by status or ethnicity, proving that with courage, any barrier can be overcome. Shetterly's work reminds all that even as people celebrate significant milestones in the 21st century, the battle against prejudice continues.

Despite legal advances and equal access to institutions, the shadow of racism endures. Tragic events continue to expose the realities of police brutality and ingrained racist attitudes. The worldwide demand for justice following such incidents reflects a shift in public awareness but underscores that real change requires more than passive non-racism. To truly eliminate these deep-seated biases, individuals must find the courage to actively oppose racism. As Shetterly notes, taking the first brave step toward equality opens doors to endless possibilities.

Margot Lee Shetterly's work does more than recount history; it reclaims it. The legacy of Katherine Johnson, Dorothy Vaughan, and Mary Jackson is evident in NASA's eventual desegregation and in modern efforts to advance diversity in STEM. Their story shows that technical excellence can challenge social norms. Though hidden by the prejudices of their time, their calculations remain woven into the fabric of American history, reminding all that progress often depends on the work of those society tends to overlook.

Works Cited

Capito, Eliza. "Hidden Figures Margot Lee Shetterly." *Studypool*, May 2021, www.studypool.com/studyGuide/Hidden-Figures/Themes.

Ikhsano, Andre, and Jakarudi. "Representation of Black Feminism in Hidden Figures." *Nyimak: Journal of Communication*, vol. 4, no. 2, Sept. 2020, pp. 169-80. https://doi.org/10.31000/nyimak.v4i2.2358.

Lyotard, Jean-François. "The Different Phrases in Dispute." *The Postmodernism Reader: Foundational Texts*, edited by Michael Drolet, Routledge, 2004, pp. 207-21.

Piketty, Thomas. *Capital in the Twenty-First Century*. Translated by Arthur Goldhammer, Belknap Press of Harvard University Press, 2014.

Shetterly, Margot Lee. *Hidden Figures: The American Dream and the Untold Story of the Black Women Who Helped Win the Space Race*. HarperCollins, 2016.