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Collegiate Codebreakers: Winthrop, Women, and War

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COLLEGIATE CODEBREAKERS: WINTHROP, WOMEN, AND WAR

A Thesis

Presented to the Faculty

Of the

College of Arts and Sciences

In Partial Fulfillment

Of the

Requirements for the Degree

Of

Master of Arts

In History

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By

Marlana Mayton

Abstract

During World War II, college-aged women from across the nation filled United States Army and Navy secretive cryptanalysis facilities to help win the war. For many women, colleges facilitated involvement in codebreaking. Through information gathered in oral histories, this thesis primarily explores war related programs at American colleges and the young women that became cryptanalysts. Academic institutions, like Winthrop College, became the nuclei for colligate codebreakers. They acted as early crypt education centers, through the offering of cryptology classes, functioned as recruitment centers, and operated as essential training hubs. While in school, young women were saturated by a climate of war and secrecy as campuses became militarized during this period. Their careers in academia and moral character came into account when cryptanalysis sectors began searching for loyal workers. While working as codebreakers for the United States government, women experienced a degree of freedom and witnessed a change in their position. In the name of the war effort and patriotic ideologies, female cryptanalysts broke codes and tested the strength of American ciphers. From college campuses to Army and Navy facilities, young women played essential roles in the war effort.

Acknowledgments

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Without constant love and encouragement from my mother and father, the completion of this project would not have been achievable. They motivate and inspire me every day.

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Introduction: Winthrop, War, and Women

Rock Hill, South Carolina, a sleepy college town in the late 1940s, harbored a serious secret. In the old ivy-covered burnt red brick and mortar buildings of a women's college founded in 1895, right on the main drag, young women were devoted to the war effort. They were practicing cracking codes and bringing the raging war home to Winthrop College. During the fall semester of 1942, a single newly proposed class at Winthrop would quickly change the trajectory of select small-town young college-aged and college-educated women, sending them far from home to engage in the hidden undercurrent of the intelligence sector. The 60 - 100 Winthrop women that partook in the newly minted class gained the skills to keep the Axis Powers on their toes and help their nation battle adversity. However, only thirty-three would be able to put their new skills into practice at various secretive government facilities.[1] This course in cryptology, the study of codes and the practice of creating and breaking them, would allow young women to participate in the war effort in ways unattainable in the past. In this rapidly developing field, women left behind a long-lasting legacy that continues to resonate today in the modern landscape of cybersecurity.[2] Young college-aged women were intrinsically involved in participating in the war effort. Fueled by their patriotic ideologies and the need to help, female codebreakers were major actors, involved both in the intelligence community and in ending World War II.

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[1] Susanna O. Lee, "A Brief History of Cryptology and Winthrop" (2016), *From Winthrop to Washington*, Louise Pettus Achieves, https://digitalcommons.winthrop.edu/winthroptowashington/20, 2.
[2] Jennifer Wilcox, *Sharing the Burden: Women in Cryptology during World War II* (Fort George G. Meade, MD: Center for Cryptologic History, National Security Agency, 1998), 16.

A cryptology course was brought forward to the curriculum committee and secretly implemented into Winthrop College's available course schedule, nearly a year after a foreign military strike on United States' soil in Hawaii on December 7, 1941. Clad in their required blue and white skirt and blazer uniform set, girls bustled to class. If asked where they were going or what course they were attending, students gave quick and vague excuses. The thought of letting the cat out of the bag and blabbing about where they were going or what they were doing was out of the question. Harsh punishments would follow not only those students that betrayed their precious covert secret but the universities they attended as well. There, being guided by Dr. Ruth Stokes, Head of the Math Department, they would practice cracking codes and get introduced to a future that would be upon them sooner rather than later, as the United States entered World War II. Tucked away in long-established buildings on beautiful campuses all over America, young college women were learning how to help win the war.

All over the nation, select groups of college-educated women were directly recruited off campuses, selected at the recommendation of their alma mater, or independently began seeking out United States Navy WAVES or United States Army WAC recruiters after their creation in 1942. Those with specific skills and degrees in language, music, science, and math were precious commodities for, at times, dueling Navy and Army cryptology programs. More importantly, these women needed to exude a loyal disposition and possess high integrity due to the secretive and sensitive nature of

their work.[3] While skills in cryptanalysis were teachable, a high moral character was a prerequisite that must already exist within the women's personality.

Many were recruited from, recommended by after graduation, or trained at women's colleges all over the country. Those chosen would eventually deploy their skills at military-operated facilities, like Naval Shipyards, Arlington Farms in Virginia, or WAVE headquarters in Washington, D.C. They became part of the female home front force that dutifully worked to end the war in silence, cracking and creating codes in an effort to keep Allied lives safe and end the war promptly. Sworn to secrecy, these women fractured enemy codes and would keep quiet about their actions for decades, receiving little, if any, recognition for their work.

The historical context in which these young women exist is an essential aspect of their stories and experiences. While the rest of the world was involved in a violent and stormy conflict, these women were just finishing up high school, starting their college careers or entering the workforce as teachers or secretarial workers. Some were making plans with boyfriends and friends. Some were agonizing about what outfit to wear to the next outing or get together. Some were fretting over assignments and deadlines. Some were deciding on what to do next in their personal and professional lives. All were young average American girls with plans for the future. Yet still, these women recognized that trouble was brewing elsewhere, and the United States could not remain insulated from the horrors occurring beyond the horizon for very long.

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[3] Wilcox, *Sharing the Burden,* 3.

Like these women, the United States was also planning, mobilizing, and acknowledging the dark encroaching cloud over Europe growing larger. Staying out of conflict seemed to be growing less and less possible as the months passed. More money began funneling into defense means a year after World War II started. The Selective Training and Service Act of 1940 required males between the ages of eighteen and thirty-five to register in a draft. It also allowed for aid in the form of leased weapons to Great Britain, in an attempt to stave off any direct American participation. The nation became physically involved after the deaths of 2,403 Americans, the destruction of five battleships, and 200 planes in 1941.[4] Forced to leave the isolationist approach behind, America was wrenched from their sketchy neutral stance. The nation was now diving headfirst into a volatile multi-nation conflict they so desperately tried to avoid.

The United States had now officially entered the fray by declaring war on Japan a day after Pearl Harbor on December 8, 1941. Nearly two years after the fighting had begun, with a virtually unanimous vote, the nation was gearing up to make a unified entrance. Industry revved up tenfold, ill-prepared military forces began training and enacting drafts to gather bodies ready for war, and the home front was ratcheting up to prepare for a hard-fought battle. As male classmates, friends, and family members began disappearing to training facilities and foreign lands, women grew restless. In 1942, Margaret Culkin Banning, author and women's rights advocate, penned in her book *Women for Defense* that, "women themselves cannot win this war. But quite certainly, it

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[4] Penny Colman, *Rosie the Riveter: Women Working on the Home Front in World War II* (NY: Crown Publishers, 1995), 6-7.

cannot be won without them."[5] Unknowingly answering this call to arms, women went to work for victory in factories, farms, and in the military sector. A void in the workforce at home and a need for manpower overseas generated a vacuum that women were willing to fill. With the creation of WAVES and WAC, women could channel that restlessness and allow for the replacement of viable men.

Women were unquestionably a present and dynamic force during World War II, as both civilians and enlisted personnel. One well known and acknowledged sector that women made a considerable wartime influence was the labor pool. During the war years, more than six million women flooded the labor force participating in skilled and unskilled labor, creating a large pocket of womanpower.[6] At home, they worked in munition factories, putting together airplanes, tanks, ships, trains, and other war equipment for American soldiers all over the world. They labored on farms and even worked construction, all while remaining feminine. Here, these women learned viable skills, often made more money, if working before the breakout of conflict, and made a significant impact on the war effort. Wartime propaganda had a hand in ballooning the percentage of women workers in an ailing labor pool. Radio and print media called upon the patriotic nature of American women by emphasizing the position of men in this conflict, in danger, and need of their help.[7]

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[5] Margaret Culkin Banning, *Women for Defense* (NY: Duell, Sloan and Pearce Publishing, 1942), ix.
[6] Colman, *Rosie the Riveter*, 16.
[7] Doris Weatherford, *History of Women in America: American Women and War II* (Edison, New Jersey: Castle Books, 1990), 117.

Representing anonymous female labor involvement during World War II was Rosie the Riveter, a determined woman dressed in an industry worker smock and dotted red bandana tied over her brown hair. The female factory worker is shown with perfectly plucked and shaped dark eyebrows, a face full of makeup including mascara fanning out her long eyelashes, and polish on her nails, like many of the propaganda photographs taken of women working in industry during this period. Rosie, and Rosie type women, were splashed across newspapers, magazines, and posters, stating, "We can do it!" These promotional and inspirational images offered women positions in the growing defense industry. Ever visual and in the public eye, Rosie the Riveter became the classic image of American women during the war and a feminist icon for years to follow, symbolizing women in the workforce.

Enlisted female personal occupied a relatively visual and incredibly significant role during World War II. More than 350,000 women served the military in some capacity by the war's end, and at full strength, 271,000 women were in uniform.[8] Often enlisting for the duration plus six months, female military personal assisted in many fields and facilities. Serving in sections separate from the men in each military branch, women worked as nurses, contributed by doing clerical work, and some even served overseas. Many cryptologists donned the WAC beige and olive-green uniform and the WAVES navy designer garb.

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[8] D'Ann Campbell, "Servicewomen and the American Military Experience," in *A Women's War Too: U.S. Women in the Military in World War II*, ed. Paula Nassen Poulos (Washington, D.C: National Achieves and Records Administration, 1996), 18.

Now, officially invited into a realm that had long been occupied by men, women became formal participants. In this domain, women typically skirted around in the margins in an often informal, often ahistorical capacity. War, and all its aggressive and violent intricacies, had primarily remained an entity lorded over by males in what was a masculine platform. The formal introduction of women shook this ideology to its core and threatened to disturb set gender roles, but issues with female participation arose. Naysayers claimed that, "it must be tolerated and encouraged only to the degree that it did not disrupt systems of male dominance and power."[9] This is the dogma that placed most enlisted women in auxiliary positions similar to typical feminine jobs, like a nurse or clerical worker.

Women of color faced further difficulties and restraint on their wartime activities, supporting a nation that did not support them. In the beginning, the United States Army was the only branch that reluctantly allowed the addition of black women into their ranks. The Navy would later, begrudgingly, do the same thing. The WAC, following similar Army policy, placed a 10.6 percent quota on the acceptance of black women, and out of the 440 women training to be officers, only forty were black.[10] Black enlisted women who did make it past the strict quota found themselves almost entirely segregated from the white enlisted women. The military, mirroring civilian life, placed women of color in separate lodging, mess tables, and training rooms. Black women were also absent from

[9] Leisa D. Meyer, "Creating a Women's Corps: Public Response to the WAAC/WAC and Questions of Citizenship," in *A Women's War Too: U.S. Women in the Military in World War II*, ed. Paula Nassen Poulos (Washington, D.C: National Achieves and Records Administration, 1996), 26-27.
[10] Emily Yellin, *Our Mother's War: American Women at Home and at the Front During World War II* (New York, NY: Free Press, 2004), 211.

much of, if not all, the official propaganda geared toward women during this period. Nevertheless, despite the obstacles placed in front of them and their forced separation through the practice of segregation, black women were involved and present in most sectors of the military, including the Army's cryptanalysis branch.

A hidden and relatively unmentioned undercurrent of real civilian and enlisted women also worked on the home front during World War II. Compared to their visual and iconic counterparts in the defense industry, individual sections of enlisted females and dutiful women on the home front rationing goods and growing victory gardens, female cryptologists lived mainly in the shadows during the four-year long conflict. No fictional public figure existed to share the same public and publicized domain as Rosie the Riveter. Instead of proudly displaying or claiming their positions to the masses, these codebreakers quietly employed subterfuge and signed oaths to pledge their silence. However, women cryptologist made up nearly half of the active American cryptographers.[11] These female cryptologists fell into an interesting category. The codebreakers became actively involved with dangerous war activity; however, it was through a clerical type job. They bumped up against a commonly male-dominated environment by participating in a familiar position for women. Cryptanalysis became a vehicle for young women to impact the war and mobilize further into the public sphere.

The college campus became a steppingstone and incubator for war ready young women in the United States. Academia, despite its perceived stuffiness and its, at times,

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11 Liza Mundy, *Code Girls: The Untold Story of the American Women Code Breakers of World War II* (New York, NY: Hachette Books, 2017), 31.

frustrating bureaucratic nuances, allowed for women to obtain a certain amount of autonomy. Through getting an education, though limited to choices deemed feminine, and gaining some sense of independence while on-campus women exercised self-determination. In coeducational institutions across the United States, declining male enrollment and faculty employment opened up chances for female students and professionals. Like in the labor sector, women filled those roles too. For these women, entering higher education was not often encouraged and ended with little reward. Attending college was perceived as a hindrance to the natural process of marriage and child-rearing for women during this period.

However, in a positive twist, World War II created the perfect storm for women in academia and the college campus itself. Within the practice of cryptology, educated and skilled women were desperately needed and sought after. All over the nation, higher education institutions were holding the perfect candidates. By establishing cryptanalysis courses at the behest of the United States government, colleges became the facilitator of these programs and directors of those chosen. Colleges became instrumental in the requirement of many female cryptologists, acting as an aid or a channel for military personnel to mobilize select individuals. Some women were selected by their institutions years after their graduation as alumni. The college served as a training ground not only for the mind but for the body as well. Even those that did not officially attend a higher education institution were attached to a college campus in some capacity. The WAVES held basic training at colleges, utilizing the dorms, grounds, and gymnasium. Colleges

also served as a home base for these women during their basic training by providing necessary creature comforts like lodging and a cafeteria after a long day of marching.

The female codebreakers of World War II have been a topic that has been relatively overlooked and underdeveloped; however, a few authors and scholars have unmuddied these waters. In 1998 Jennifer Wilcox, now assistant curator of the NSA National Cryptologic Museum, published a sixteen-page booklet about female code crackers. *Sharing the Burden: Women in Cryptology during World War II* gives a brief but thoroughly informative breakdown of female participation in cryptanalysis. Nearly nineteen years later, in 2017, Liza Mundy journalist and author, published *Code Girls: The Untold Story of the American Women Code Breakers of World War II.* Mundy set out in-depth to detail the involvement of female code breakers in World War II, something that she argues has been overlooked in history. Other useful smaller chapters and inserts about the women code breakers of World War II exist in books about the conflict, but they, at times, lack any true extensive study. Whereas Mundy's research briefly touches upon the women at Winthrop, and Wilcox's does not at all, this research will use them and their experiences as the primary case study when applicable through their oral histories. This thesis hopes to expand on these bodies of work and add to this field through a wholly historical point of view, adding different shades of analysis and information.

This thesis will explore the education, lives, actions, struggles, and environment of collegiate codebreakers during World War II, roughly ranging from 1942 to 1945. By collegiate, this thesis refers to those who received a college education and were recruited

through their institution, those who participated in a cryptology course throughout their time in academia, and those who were trained or stationed on a college campus during their military service basic training. This thesis relies heavily on oral history and the first-hand description of involvement by those that experienced it. These interviews provide a personal narrative that is important to women's history in conflict. With a primary focus on the Winthrop College codebreakers, when applicable, this piece creates an in-depth and easy to follow journey through a troubling time by following those female graduates through their contribution to winning World War II. The voices and experiences of other women not involved with Winthrop College are also used to portray the experiences completely and augment the collegiate codebreaker involvement this thesis plans to recount.

What this thesis does not intend to do is insert or place women into an already cultivated and established narrative. It means to further reveal and uncover the real-life actions of young college-aged women during World War II and tell their story from within their historical context. As mentioned previously, action and war are often encoded in the masculine. The type of work these women were involved in was highly secretive, leading to silence on behalf of those females participating through oaths and their understanding of the dangers possible if they let any valuable information slip, thus allowing for historians and contemporaries to overlook their contributions unintentionally. Their self-censorship was partially due to their patriotic inclinations and the atmosphere in which this total war was happening. This topic connects to gender history and war history on its own, through its particular parameters and actors. Simply

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unearthing the silence suppressed accounts of the women immersed in cryptanalysis situates them within history.

Chapter 1 is a brief introduction to the practice of cryptology and its uses in World War II. This introduction includes a discussion of what codes were, what was used to break them, and how they were cracked. This chapter also explores the reasons for women being recruited into the trade of cryptanalysis. Working in cryptology created an odd environment for women during this period; it was wartime activity but not identified as masculine work.

Chapter 2 discusses the atmosphere of the nation during this tumultuous period, the state of college campuses, including Winthrop College, and the lives of future cryptologists. Observations by the women about campus life, the nation, and their own experiences before and during the outbreak of war due to the attack on Pearl Harbor are discussed in this section. This chapter covers the struggle or triumph of putting life on hold and the strain of having family and friends in the military.

In chapter 3, those chosen, either through their own volition in the form of independently joining up or by active recruitment through higher education institutions, will be examined and analyzed. Their majors, skills, characteristics, personalities, and how they got involved with cryptology are studied here. This section will discuss the creation of the WAVES and the WACs, a driving force in many of these women's war experiences and the reactions of those around them when they joined the military. Also discussed in this chapter are their reasons for joining the war effort and their thoughts on what they were doing.

Chapter 4 covers winning the war from home and campus, through programs offered at colleges. This section discusses the cryptology classes at Winthrop College. Featured heavily here is instructor Dr. Ruth Stokes and her involvement with the course, issues with keeping the class going, and bureaucratic hold-ups with college leadership. This chapter examines the high secrecy level of the cryptology operation, even on college campuses. Also included are the experiences of other women's college cryptology instruction and going through basic training at colleges across the nation.

In chapter 5, the move from everyday college campuses to secretive government facilities is highlighted. Involvement at government buildings like Arlington Hall, Naval Shipyards, and WAVES headquarters will be discussed, including the grounds, the people, and the experiences had at these often-clandestine areas. Also, this chapter discusses the little free time cryptologist had and how they spent that time far from home.

Chapter 6 covers the female cryptologist's roles in winning the war. Acting as the main force on the home front, female participation was paramount. This chapter discusses shifts codebreakers worked, codes broken, and their results. Findings that the codebreakers themselves would never know or fully understand until later. This section covers the intense secrecy and sensitive nature of the women's cryptology work and the weight the women carried due to that responsibility. Also, the dynamic and relations of being a female in an often-male dominated sphere are examined.

Chapter 7 finishes up the female cryptologist's involvement during World War II. This chapter covers the reactions and celebrations to VE Day and VJ Day. It explores the

women wrapping up their lives and work in cryptology to return home to normal civilian life after an existence of secrecy and working away from home.

All over the nation, in old ivy-covered burnt red brick and mortar buildings of academia, restless young women were learning how to help win the war. Through their collegiate affiliations and connections, they branched out, filling positions quietly with the utmost loyalty. They were preparing to depart on a journey that would transform a period of their lives and shape the path of communications for future generations. Venturing into the new landscape of war on an official capacity, energized by patriotism and a need to defeat enemies seen as genuinely evil, these female cryptologists broke boundaries. They helped secure a victory on behalf of their nation.

Chapter 1: Cryptology Basics and Women in the Intelligence Community

This chapter is an explanation of the practice of cryptology, its uses, and its importance during World War II. Throughout this tumultuous time, many breakthroughs were made in the field of cryptoanalysis, powered by those working in the trade and the need to end the ongoing war. Cryptology offered many new avenues for American women. The field also presented itself differently when compared to careers typical for females during this time. Young college-educated or trained women in the field of cryptanalysis were extremely valuable. Recruited for skills and majors that aligned with the intricacies of cryptoanalysis, women created an extremely useful silent clandestine undercurrent of loyal codebreakers.

Cryptology is the study of secret codes or ciphers and is a broad descriptor of many parts of the trade. Cryptology encompasses two fields. Cryptography, which is creating codes for protection by encryption and cryptanalysis, which is breaking codes or gathering encrypted data without the key or codebook.[12] When a codebook would fall into the cryptanalysis' hands, it was like striking gold. The female codebreakers of World War II participated in both practices, testing American codes to see their strengths and weaknesses and, more importantly, exploiting enemy German and Japanese codes when intercepted. Encrypting, disguising plaintext information and decrypting, decoding ciphertext into legible terms, often meant life or death when messages detailed attacks on Allied forces.

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[12] Reinhard Wobst, *Cryptology Unlocked*, trans. Angelika Shafir (West Sussex, England: John Wiley & Sons, Ltd, 2007), 1.

When uttered, the term "cryptanalysis" typically invokes feelings of secrecy, espionage, and the act of peeking in on other's data. It can drum up imagery of shadowy figures clad in dark overcoats in abandoned alleyways speaking in code, trading secrets to bring down an evil rival army, or keep allies safe in places far from home. Or, in a more modern sense, it can conjure depictions of cryptanalysts, often working with government entities or private companies, safeguarding sensitive data from hackers with online security systems. Cryptanalysis elicits a sense of danger and urgency during any period, especially amid times of unrest and war. However, modern advancements in technology have relegated certain simple aspects of cryptology into the mundane lives of ordinary folks.

The role of cryptology has changed drastically since both World Wars and is a part of everyday life. PIN codes for cellphones and debit cards are examples of modern-day cryptography, something we come in contact with nearly every day. Children creating secret languages with a key to cipher encrypted messages back and forth is another simple example spanning back to days spent in schoolyards. William and Elizabeth Freidman, both well regarded in the field of cryptography, used cryptographic systems to analyze the authorship of Shakespeare's plays in *The Shakespearean Ciphers Examined: An Analysis of Cryptographic Systems Used as Evidence That Some Author Other Than William Shakespeare Wrote the Plays Commonly Attributed to Him*.[13] No longer is encryption sequestered in the halls of militaries, governments, and national intelligence agencies, its commonplace in average life, being used by ordinary people on

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[13] Rob Curley*, Cryptology: Cracking Codes* (New York: Britannica Educational Publishing, 2013), 28.

an ever-connected planet full of machines and essential information. Nevertheless, it does play an important part in today's military with threats of cyber terrorism on the rise.

In terms of the modern military, the practice of cryptology has evolved alongside warfare in an increasingly globalized connected world. The use of "computer-controlled communication" ratchets up the need for protection of information through cryptography.[14] As warfare becomes progressively cyber-related in terms of hacking and computer-related attacks, cryptologists presences grow more and more critical. Modern-day cryptologic technicians and linguists identify and examine foreign communication, much like those pioneers in the field before them but on different terrain and machines. They gather external intel for intelligence reports using computers and other communication aids, which have, over the years, transformed drastically since World War II.

During the conflict, both sides began creating and adding to already existing electro-machines that would encode and decode enemy ciphers in a twisted pre-space race run for crypto superiority. Throughout World War II, rotor machines became standard tools for encryption and decryption. Not to be mistaken for computers, these machines ran on electricity that pushed the rotating wheels covered in letters of the alphabet. Often looking like thick square-shaped typewriters, due to the mechanical keyboard positioned at the bottom, with rolling code wheels at the top, these machines were the core of World War II cryptology. In 1944, one female cryptanalysis recalled

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[14] Henk C.A. van Tilborg, *Fundamentals of Cryptology: A Professional Reference and Interactive Tutorial* (Norwell, MA: Kluwer Academic Publishers, 2000), 1.

working with a machinist to construct their own device to solve a problem they were

having. They worked to create something that would reconstruct additives while trying to

figure out sequences. The codebreaker, stating the outcome through an interview said

that, the crudely thrown together machine would spit out pieces when cycling, hitting

other workers in the head.[15] Instruments used could be incredibly complex and very

difficult to break, with a multitude of possible results. The German Enigma machine had

26^3 possibilities for the three-rotor positions with a result of 1,054,560 possible keys.[16]

Thus, codebreakers worked around the clock in long shifts to combat enemy cipher

systems with such large pools of potential outcomes. Such complicated systems and

machines called for strong cryptology programs, filled with willing and intelligent

workers.

During World War II, a robust cryptology program was an essential strength in

many ways. Cryptologists and their programs were vital in shortening the war, saving

lives, missions, and even turning the tide of battles. For example, The Battle of Midway,

an important point in the naval war in the Pacific, was won by the United States due to

information provided by cryptanalysis from breaking Japanese codes about the attack.[17]

Other Allied Powers, like the British at Bletchley Park, made considerable leaps in

cracking enemy codes. A cryptologist there claimed, nearly fifty years later, due to the

secrecy engrained into their employment, that their work helped shorten the war by two

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[15] Juanita Moody, interview by Jean Litchty, Mike Peterson, and Brad Burke, June 16, 1994, transcript, National Security Agency, https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/oral-history-interviews/nsa-oh-1994-32-moody.pdf.
[16] Wobst, *Cryptology Unlocked*, 44.
[17] Curley, *Cryptology: Cracking Codes*, 41.

to four years.[18] Codebreakers worked diligently in silence to curtail enemy advances and were a significant pillar of support in the intelligence community during this tumultuous period.

However, such importance and secrecy came at a price and, in a way, hindered cryptology development and the reduction of wartime activities. Allied nations kept some information and data secret from each other, and even the United States Army and United States Navy had competing cryptology programs. This inhouse competition led to both branches battling for dominance on college campuses, provoking heated responses from the Navy toward the Army.[19] The Brits in Bletchley Park, the Army, and the Navy all had separate bombe machines. A bombe machine was an instrument used to decipher the German's Enigma. Due to the sensitive nature of their findings, program leaders were hesitant to exchange intelligence, even if it was with allied nations. Keeping information and schematics under wraps seemed like the only option when risking a leak could lead to hours and hours of work being made moot.

American women have long been a specter in the margins of war, especially in the intelligence community. Their official introduction through military sectors into cryptology during World War II would mark a historical movement, but women were involved with intelligence gathering in past wars to some degree. Women worked as unofficial spies during the American Revolution and the American Civil War,

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[18] Sir Harry Hinsley, "The Influence of ULTRA in the Second World War" (Babbage Lecture Theatre, Cambridge, UK, October 19, 1993), Web Archive, https://web.archive.org/web/20120706194507/http://www.cl.cam.ac.uk/research/security/Historical/hinsley.html.
[19] Liza Mundy, *Code Girls,* 8.

eavesdropping on soldiers and passing secret notes to their handlers through established

spy networks. In World War I, women worked with new technologies and began their

first interaction with cryptology.[20] They manned switchboards, operated telephones, and

worked to create first-generation codebreaking machinery. However, the young female

cryptologist smashing codes in World War II had an authorized presence and were able to

situate themselves permanently into the intelligence community. Due to the creation of

the female sections of the military and their incredible work, these codebreakers became

trailblazers in the years leading up to the Cold War. This proxy conflict began heating up

shortly after World War II and allowed female cryptologist to continue their work.

Women in war, especially the code girls in their sanctioned capacity, have always been a

presence in the war.

Young women joined Navy and Army ranks through their institution or joined as

civilian workers into this secretive and shadowy institution. They began working with the

Navy in the OP-20-G office and with the Army in the Signal Intelligence Service section.

These female codebreakers filled positions that men departing for the front left vacant.

Women in this field fell into an interesting category. They were in the war environment

but participating in work akin to clerical labor. One author, Amy Martin, contends that

cryptology was not traditionally considered a male job.[21] This is argued for two reasons:

it was office type employment, similar to secretarial and school teacher work, and men

were deemed as the ones to go overseas into battle as soldiers, and if they did not it was

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[20] Amy J. Martin, "America's Evolution of Women and Their Roles in the Intelligence Community,"
Journal of Strategic Security Vol. 8 (2015): 100, https://www.jstor.org/stable/10.2307/26465249.
[21] Martin, "America's Evolution of Women and Their Roles," 100.

seen as a negative or blemish towards them in society's eyes. To some, women engaged in cryptography was not as shocking as their Rosie the Riveter counterparts working in factories toiling away in the defensive industry. That ideology can be rooted in the gendered nature of labor. In reality, most women worked in majority-female departments and job classifications.[22] Also, the secrecy of codebreaker activities made their contributions unknown to the public for many years and not thrust in the spotlight with propaganda.

American women had little choice in academic majors and the job market during the early 1940s. Many worked in an office setting or a school in some capacity, if they worked at all. One Winthrop College codebreaker, Jeuel Bannister Esmacher, stated that, "we didn't have the choices you have now. You kinda were a secretary, teacher, music teacher, stenographer – not a lot of choices."[23] With cryptology programs, women could serve their nation and take a stake in the war. Though cryptology was deemed a feminine task, the young cryptologist took hold of the field and made it their own. They worked long days at desks in secretive offices and dealt mostly in paper, but the information on those papers proved priceless.

Cryptology has played a significant role in the past and present, especially when dealing with military activities. Due to wartime happenings, cryptology has experienced many a milestone and development. World War II allowed these programs to advance

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[22] Ruth Milkman, *On Gender, Labor, and Inequality* (Chicago: University of Illinois Press, 2016), 48.
[23] Jeuel Bannister Esmacher, interview by Michelle Dubert-Bellrichard, January 20, 2015, transcript, Louise Pettus Archives and Special Collections, https://digitalcommons.winthrop.edu/cgi/viewcontent.cgi?article=1104&context=oralhistoryprogram.

and bring female codebreakers into the fold. These young women offered valuable minds and bodies for the war effort. They put forth their skills acquired in a university setting by willfully joining up or quickly accepting requirement inquires.

Chapter 2: A War Brought Home

This chapter demonstrates the general feeling or mood of the nation and college campuses at the start of World War II. The conflict was originally far from home, but it soon crashed onto America's doorstep in the form of a fiery and devastating attack. After this outbreak, the war was in full swing with the United States armed forces fighting overseas and the home front participating in their own operations. This chapter will discuss the change in young college women and their activeness during the early war years before America entered World War II. The college campus environment and atmosphere that future codebreakers experienced set them up for their entry into wartime activities. It became a setting that was conducive to war-focused endeavors and courses, influencing future cryptologists. Once America entered the fray, ideologies and actions changed, in the nation and on campuses, like Winthrop College. Pearl Harbor, a game-changer not only for the United States but for collegiate codebreakers as well, was a startling wake-up call. The attack became a distressing motivator. Those affected became impacted by racial tensions that they later confronted. Lastly, this chapter will discuss the difficulties in having loved ones serving in the military and putting life on hold to become enraptured with the ongoing war that would soon take hold of their careers and existence.

On September 1, 1939, Nazi Germany, after capturing Austria and devouring Czechoslovakia, invaded Poland, and two days later, on September 3, Britain and France declared war on Germany. By September 5, the United States had announced its

neutrality from the conflict.[24] Immediately after Europe became immersed in World War II, just twenty-one years after the end of the horrid Great War, the United States was pulling back away from the conflict. The atmosphere of the nation during this tumultuous period reflected the September 5 act of neutrality. In the days after Germany invaded Poland and subsequent declarations of war from both Britain and France, American citizen expressed their tepid thoughts on war. According to a survey, Americans were in overwhelming agreement to sell food supplies to the newly warring nations but nearly split changing the Neutrality Laws so that the US could sell war materials to England and France with 57% responding "yes" and 43% responding "no."[25] Most felt that the US should remain neutral at the beginning of World War II. Citizens were torn on feeding the war machine and supplying materials for combat but were only willing to help friendly nations through other means.

Americans were largely opposed to entering a "European War" in the months leading up to and following Hitler's 1940 blitzkrieg attacks. Americans answered if the United States should declare war on Germany in support of England, France, and Poland and should they deploy forces to support the countries battling Hitler's Germany, diving headfirst into the brewing clash. In response to this question, American citizens were staunchly opposed, with 84% rejecting the idea.[26] Europe seemed far removed and distant from the United States, and Congress had already been insolating the nation through

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[24] Donald B. Cole, *Handbook of American History* (New York, NY: Hancourt, Brace &World, INC., 1968), 223.
[25] George H. Gallup, *The Gallup Poll: Public Opinion 1935 – 1971* (New York, NY: Random House, 1972), 181.
[26] Gallup, *The Gallup Poll*, 180.

Neutrality Acts, which prohibited interventionism with quarrelsome nations. This national sentiment of non-interventionist reflected on college campuses like Winthrop College, creating a relatively pacifist and cautious environment for future codebreakers during the early war years.

In 1939 the young women beginning their fall semester at tranquil Winthrop College sensed no real trouble concerning squabbles overseas. During this period, the conflict was a simmering foreign quarrel, far removed from Rock Hill, South Carolina, and their peaceful existence on a manicured brick and mortar campus. Entering a global dispute seemed like a distant and impossible situation. Nonetheless, outside forces remained stark reminders of troubles brewing overseas. The United States Marine Band performed at Winthrop, much to the girls' delight. A news analyst was invited to the campus to comment on German aggression and appeasement by other European nations facing Adolf Hitler, and a medical missionary held a talk on Japanese hostility in Manchuria, which included anti-Japanese sentiments.[27] These events allowed the war to exist on the fringe of Winthrop College, never taking center stage when competing with campus traditions and other forms of entertainment. Officials made the tensions known to the young women of Winthrop during the infancy of World War II.

The world was at war, but the girls at Winthrop were mostly withholding and suppressing any conflict-based ideologies. Under the leadership of President Shelton J. Phelps, the campus hosted a Peace Week during the fall of 1939. Peace Week set out to

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[27] Ross A. Webb, *Winthrop University: The Torch is Passed* (Mansfield, OH: BookMaster, Inc., 2002), 129.

help students slog through possible propaganda and the overwhelming amount of information coming through the radio and in newspaper articles. A poll conducted during this week showed that only 19% of Winthrop students favored war if the Western Hemisphere was invaded, and only 18% favored war if the Allies were to fall to Hitler.[28] Like the nation, these polls revealed that the young women at Winthrop showed little interest in joining the growing conflict. Only on the basis of a direct attack and invasion or if friendlies in Europe failed to defeat Germany and its allies would the girls on campus favor the United States entering World War II. An article published in *The Johnsonian*, Winthrop's student newspaper, warned students against being swayed by sentiment, emotion, and prejudice. The opinion piece argued that America must look at the entire situation through unbiased lenses before jumping in headfirst.[29] Whether fueled by a national stance on non-interventionism or disinterest in newspaper headlines, Winthrop College's constituents preferred a pacifist attitude toward the war. There would be no second world war for the women of Winthrop College.

By early 1940, the United States still felt it would be able to dodge involvement in World War II. When questioned on neutrality and if they thought the United States would go to war in Europe, American citizens mostly answered that the country would be able to stay out of the war.[30] However, as the year progressed, the war overseas was in full swing, and Hitler's Nazi Germany was surging forward. Germany began attacks on Demark and Norway, Italy declared war on Britain and France, France surrendered to

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[28] Webb, *Winthrop University*, 129.
[29] "Peace as a Project," *The Johnsonian*, editorial, October 27, 1939, https://digitalcommons.winthrop.edu/thejohnsonian1930s/161.
[30] Gallup, *The Gallup Poll*, 208.

Germany in June, German bombardments of London began, and Italy invaded Greece and Hungry. In a December 2 poll 59% believed that the US would eventually go to war in Europe.[31] The conflict overseas was brewing, and American citizens acknowledged the storm swelling, but still held out that United States intervention in a foreign war was avoidable.

The atmosphere and attitude on Winthrop College's campus changed drastically during 1940. The war was in full swing overseas, and Winthrop began feeling its impact. In 1940 Jeuel Bannister Esmacher and Sara Stringfellow, both future codebreakers for the Army's Signal Corps, started their first semesters at Winthrop. Both women remember the apprehensive climate on campus due to the war. Stringfellow stated that it was a "difficult time" and recalled an atmosphere of "worry, of concern, and reading the newspapers every day about a war going on."[32] Esmacher remembered a similar feeling of unease, affirming that, "everyone was worried."[33] In the following year, Peace Week would be a forgotten flash in the pan. Gone was the previous year of optimism toward staying out of the battles far from home. The war was slowly crawling toward America's doorstep and into these upcoming cryptologists' backyard.

The worrisome energy of college women translated into positive social activities on campus. As Britain faced fierce fighting, the Winthrop College girls created "Bundles for Britain," girls were encouraged to ride the railroad instead of in their cars due to

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[31] Gallup, *The Gallup Poll*, 252.
[32] Sara Stringfellow, interview by Anna Lee, March 29, 2016, transcript, Louise Pettus Archives and Special Collections, https://digitalcommons.winthrop.edu/cgi/viewcontent.cgi?article=1021&context=winthroptowashington.
[33] Esmacher, Louise Pettus Archives and Special Collections.

rubber shortages, and some participated in the "Farm for Freedom" program over the summer.[34] Young college women began mobilizing and channeling their restless drives into wartime efforts. These activities and programs would shape the Winthrop codebreakers' ideologies about war and helping from the home front. Students pushed forward, continuing their academic careers, all while keeping a watchful eye on the fighting. No matter the anxiety of war and unease on campus, Esmacher commented that, "the students did continue to study and learn and work."[35]

In January 1942, Winthrop College unanimously adopted and published six wartime resolutions that dealt with the girls' conduct during the conflict.[36] The first resolution looked to the future, urging girls to continue their college courses with more vigor than ever to have a supply of educated women in a post-war world. The second and third resolutions dealt with morale on the home front. Winthrop girls pledged to keep "enthusiastic faith" in the ability of America's armed forces until their victory. Also, they promised to keep themselves informed about wartime events, disregarding rumor, and propaganda. This meant setting a realistic and truthful eye toward all information heard. The last three declarations handled conduct concerning services taken on by the girls. Resolution four vowed that those attending Winthrop would offer their extracurricular services for first aid training. This included making bandages and surgical dressings. The next resolution deemed that the college girls stay physically fit, "believing that this should be the first consideration in a program of war." Lastly, the young women

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[34] Webb, *Winthrop University*, 130.
[35] Esmacher, Louise Pettus Archives and Special Collections.
[36] "Winthrop Students Adopt War-Time Resolutions," *The Johnsonian*, January 16, 1942, https://digitalcommons.winthrop.edu/thejohnsonian1940s/30.

attending Winthrop must "cheerfully" accept and make whatever sacrifices they are called upon to make. The aforementioned resolutions, set by the Winthrop student body themselves, showed an understanding and acknowledgment of possible wartime issues. They demonstrated a personal degree of involvement and responsibility toward America's newly joined conflict and a degree of selflessness in its own actions for the war effort.

Winthrop students were not only interested in rationing supplies, charity work for nations under fire, and staying fit. They sensed the direct pull of the ongoing conflict. The girls, some campus officials, and the United States' government expressed interest in war focused courses and programs. There was talk in 1940 of a possible flying course for the girls at Winthrop, and in 1942 the college began offering first aid courses to students and the public. The mathematics department changed the focus of classes in astronomy to align with the Defense Department's requests. Later, in 1943, Army Air Cadets would be stationed on campus to acquire academic and military training.[37]

By the end of 1942, on a day in November, the curriculum committee at Winthrop planned and implemented a course in cryptanalysis. On the front page of the November 20 issue of *The Johnsonian*, under the headline "Class Taught by Dr. Stokes Designed to Further War Effort," a small blurb discussed the upcoming course offered by the math department. The article stated that the course would "include elements of coding, decoding, and the standard types of ciphers."[38] Headed by Dr. Ruth Stokes, the class was

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[37] Webb, *Winthrop*, 132.
[38] "Class Taught By Dr. Stokes Designed To Further War Effort," *The Johnsonian,* November 20, 1942, https://digitalcommons.winthrop.edu/thejohnsonian1940s/51.

for juniors or seniors who planned to leave before graduation. It served as preparation and training for future work and employment in the Army intelligence community. Winthrop College and its students became involved in the war effort through conflict focused courses, creating a chance for young collegiate women to expand their experiences and roles in society.

During the spring semester of 1943, Winthrop, on the behest of the federal War Department, began serving as a pre-flight training center for 320 male Army Air Cadets.[39] The training period, starting March 1, lasted five months. Cadets received academic and military instruction while on campus. The Air Cadets were stationed in the Bancroft dormitory on campus and received much fanfare upon their arrival. Day student Stringfellow commented on the enthusiastic mood of the young woman stating that, "the girls were screaming, hanging out of the windows, throwing their panties out."[40] Winthrop College, on behalf of the World War II effort, temporarily became a co-ed institution. The presence and interactions with the Air Cadets allowed the students and future codebreakers to intermingle with military personnel, something that Stringfellow and Esmacher would be doing in an official capacity in just over a year. Their residency on campus brought the war closer on a personal level. The Winthrop girls were able to make connections with these men that would head out to the frontlines and begin working in the war.

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[39] Webb, *Winthrop*, 132.
[40] Stringfellow, Louise Pettus Archives and Special Collections.

Other prominent campuses that housed future female codebreakers also felt the shadow of the war. Young collegiate women across the nation encountered male classmates disappearing through the draft, guilt, political awakening, and professors leaving campus and classes designed for the war. One future cryptologist, Juanita Moody, was a student at a small co-ed college in western North Carolina during the beginning of American involvement in World War II. Moody recalled her male classmates disappearing and the guilt she felt still being on campus. She recollected that in early 1943 the men on their campus were being drafted, and there were practically no males left on the grounds.[41] While going to Barnard College in New York City, Helen Allegrone was "completely absorbed"[42] by the war. She became part of the short-lived America First Committee, a group that was against US entry into World War II. Allegrone's decision to join this organization caused strife for her family back home. Her father was embarrassed and wanted to know how she was "getting those ideas."[43] Shortly after, she withdrew from Barnard and continued her education at Radcliffe College in her hometown of Cambridge, Massachusetts. In Erma Hughes Kirkpatrick's senior year, ranging from 1941 to 1942, her psychology professor was going on active duty in the Navy, leaving the classroom and his students behind.[44] College-aged women were impacted by a different degree of World War II on the home front. These encounters influenced their foray into the conflict.

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[41] Moody, National Security Agency.

[42] Helen R. Allegrone, interview by Eric Elliott, April 12, 1999, transcript, Women Veterans Historical Project, http://libcdm1.uncg.edu/cdm/singleitem/collection/WVHP/id/4228/rec/1.

[43] Allegrone, Women Veterans Historical Project.

[44] Erma Hughes Kirkpatrick, interview by Hermann J. Trojanowski, May 12, 2001, transcript, Women Veterans Historical Project, http://libcdm1.uncg.edu/cdm/singleitem/collection/WVHP/id/4441/rec/1.

College campuses became an epicenter for young women who wanted to work for the war effort. This environment sculpted and shaped future codebreakers by exposing them to a plethora of World War II activities, and men that would be shipped off to battle-ravaged nations far from home. Collegiate cryptologists participated in charitable projects and encountered cryptology courses at their institutions. These courses were perhaps the most significant war influence during their academic careers. It was at these college campuses where they experienced the mass mobilization of women, a relatively positive and cooperative attitude toward the conflict, and participation in programs and courses based on the fighting. Young women confronted the difficulties of conflict at home and would soon face the war in their own fight. When presented with letters from the government requesting their help or willfully volunteering their skills for the war effort, future codebreakers invoked ideologies learned and observed on their college campuses.

The United States did not join World War II until late 1941, after the Japanese bombed a naval base in Hawaii. The December 7 attack on Pearl Harbor was the United States' catalyst for joining World War II. Once bombarded in a fiery and deadly attack, America was propelled fully and formally into a global firestorm that had been burning since 1939. Now, publicly dragged into the conflict, the United States declared war on Japan just a day later. In reaction to America's war declaration, Germany and Italy returned the favor on December 11. In the months leading up to the attack on American soil, relations with Japan had begun deteriorating. President Franklin Delano Roosevelt froze all Japanese assets in America, communications broke down, and trade negotiations

came to an impasse on both sides over Japan's invasion of Indochina. Before the

violence, the American public was interested in preventing Japan from growing more

powerful, even if it meant risking a war with the other nation.[45] The early morning

surprise attack severely damaged the American naval fleet and resulted in a significant

loss of life for soldiers and sailors. Now at odds with the Axis Powers, America and the

future collegiate codebreakers were officially involved in a "European War."

The attack on Pearl Harbor was a source of extreme motivation and fear for future

codebreakers on the home front. For many of these young women, Pearl Harbor ignited

patriotic flames and made the United States entering the war a real and tangible situation.

After being catapulted into the raging conflict through such a traumatic and sudden

occurrence, these women experienced a degree of distress and thrill. Allegrone, who

described this period as an exciting and interesting time, was on a lunch date with a naval

officer. Upon hearing the news of the attack, the young officer dashed away from their

get together to return to base.[46] One codebreaker remembered the precautions her family

took living on the West Coast in California. Worried of another attack, her family enacted

safety measures. At night they kept their curtains closed in fear of planes flying overhead

and bombing them.[47]

Another cryptologist remembered how upset she felt hearing the initial broadcast

over her radio while washing dishes in her parent's kitchen on a peaceful Sunday at

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[45] Gallup, *The Gallup Poll*, 306.
[46] Allegrone, Women Veterans Historical Project.
[47] Jaenn Coz Bailey, interview by Eric Elliott, January 13, 2000, transcript, Women Veterans Historical Project, libcdm1.uncg.edu/cdm/singleitem/collection/WVHP/id/4376/rec/1.

home. Winthrop student Stringfellow echoed these sentiments stating that Pearl Harbor brought "great sadness" and triggered the drafting of her eligible male 1939 high school classmates, with many of them not making it home before the war's end.[48] The early morning December attack highlighted the unpreparedness and anxiety felt by many Americans, including these young women. Most future cryptologists would go on to work in the Japanese crypt section, working with the "Japanese problem," cracking ciphers from a nation that brought them much stress and horror in one single day.

The December 7 attack would leave lasting consequences on Japanese-American relations and societal perceptions of Japanese in the United States, including the female codebreakers. Pearl Harbor left racial ramifications that reverberated through multiple outlets in American society. Seen by the public after the attack as "treacherous, sly, cruel and warlike"[49] Japanese-Americans in the United States faced accusations and suspicion from their fellow Americans. On February 19, 1942, President Roosevelt enacted Executive Order 9066, which led to those with Japanese ancestry being forcefully relocated to internment camps, removing thousands from their careers, homes, and lives. On the first day, a reported 736 Japanese immigrants were held, and by the end of February, around 2,192 people were taken from their homes.[50] The female codebreakers could sense racial tensions rising, especially those residing on the West Coast. Some of them even engaged in unfortunate racial ideologies during this period. One codebreaker

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[48] Sara Stringfellow, interview by author, South Carolina, February 7, 2020.
[49] John Morton Blum, *V Was for Victory: Politics and American Culture During World War II* (San Diego, CA: Harcourt, Brace, and Company, 1976), 46.
[50] Mikiso Hane, "Wartime Internment," *The Journal of American History* Vol. 77 (Sept. 1990): 570, https://www.jstor.org/stable/2079186.

in a 2000 interview, fifty-five years after the end of World War II, still held a degree of resentment. She claimed that "I still have this feeling toward Japs, I'm not wild about them" and that she "doesn't have anything against them, but there's just in back this harboring thing about Japanese."[51]

While tensions burned strong during the war years, some still found the treatment of the Japanese troubling, if not during the war, then later in life. Helen O'Rourke remembered the anger and attitude towards the Japanese while working at Arlington Hall, stating that, "we came violently angry at everything Japanese…just violently angry, and said terrible things."[52] Later, one worker who had previously been a missionary in Japan invited them to her apartment and shared her positive experiences in the nation. During the war, Kirkpatrick was caught up in the moment and was glad the United States dropped atomic bombs on Hiroshima and Nagasaki because it meant that her friends were coming back from overseas. However, in 1990 she went on an emotional visit to Peace Park in Hiroshima with Japanese friends. She fully confronted those old thoughts and ideologies.[53] Jaenn Bailey lamented over the treatment of first and second-generation Japanese in America after Pearl Harbor. Living in California, Bailey grew up and went to school with many Japanese that were placed in "horrible" internment camps.[54] She

[51] Myrtle O. Hanke, interview by Eric Elliott, February 11, 2000, transcript, Women Veterans Historical Project, http://libcdm1.uncg.edu/cdm/singleitem/collection/WVHP/id/4381/rec/1.
[52] Helen M. O'Rourke, interview by R.D. Farley, November 17, 1981, transcript, National Security Agency, https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/oral-history-interviews/ORourke_Oral_History.pdf.
[53] Kirkpatrick, Women Veterans Historical Project.
[54] Bailey, Women Veterans Historical Project.

condemned the manner in which they were taken away from their homes, items stolen and broken, and houses occupied after their forced removal.

The war continued after December 1941, with the US integrating into the multinational fight. Over the next two years, ranging from early 1942 to late 1943, over 100,000 persons with Japanese ancestry were forced into internment camps in the US. The United States Army surrendered Bataan, American bombers struck the Japanese mainland, and the Battle of Midway passed with an Ally victory. Later, the Battle Stalingrad would rage and end in surrender, Africa would come under Allied control, the Allies invaded Italy, and Berlin was under heavy attack. The country became war-minded, and soldiers began shipping off to faraway places, miles from home. Fathers, sons, and brothers geared up to combat an Axis military, leaving families, education, and careers behind. Those waving goodbye and worrying over their safety were often mothers, lovers, and sisters.

Having family and friends in the military, fighting a fierce war, weighed heavily on many cryptologists and future codebreakers. One young woman, Georgia Ludington, had two brothers in the military. She stated that she felt a degree of selfishness for joining up and leaving behind her mother and father, too.[55] Winthrop College girls had family and loved ones in the military. Nearly every girl on campus had a loved one in the armed forces or knew someone that had family or friends in the services. Esmacher had many contemporaries who were drafted in their junior year while attending college at Clemson

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[55] Georgia Ludington, interview by Brenda Jones and Jennifer Wilcox, September 5, 1996, transcript, National Security Agency, https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/oral-history-interviews/nsa-oh-1996-09-ludington.pdf.

College. She had a boyfriend, who she planned to marry, attending the Citadel in Charleston, SC. However, in his junior year, he went to war. While injured in the Battle of the Bulge, he fell in love with his nurse, and Esmacher had by then met her future husband. Esmacher stated that, "most of our friends or boyfriends were away, overseas or in the states."[56] Stringfellow had a brother and brother-in-law in the services. Her brother-in-law was wounded at the Battle of the Bulge twice while her brother, who was in the Army Air Force, worked as a navigator for a B-51 bomber. With their loved ones in the armed forces or knowing others who had personal connections to the war, the ongoing fighting concerned these young women and motived them to take part to end the conflict quicker, bringing their boys back home.

Institutions, like Winthrop College, urged students to continue with their courses and education, but a war fog fell over the nation and college campuses. Ending the war in a concise and timely manner without losing too many lives weighted heavily on the codebreakers. This ideology was prominent for many young college-aged women. An editorial that graced the pages of *The Johnsonian* on December 12, 1941, attempted to rally the Winthrop girls and fueled the ideology of helping conclude the war that the United States had just entered days prior. The author wrote that, "we must not despair, but resolve to arm ourselves and fight with an end in view."[57] Just four days after declaring war on Japan, young women were already striving toward the conclusion, through any means. By 1944 Sarah Stringfellow and Jeuel Bannister Esmacher were both

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[56] Esmacher, Louise Pettus Archives.
[57] "A Pause To Think, *The Johnsonian,* December 12, 1941, https://digitalcommons.winthrop.edu/thejohnsonian1940s/29.

Winthrop graduates, released into a world at war and to a nation determined to beat foreign foes far from home. These war-conscious girls would both go on to work in cryptography sectors in the US Army, doing their part to end the war.

The environment and atmosphere that future collegiate codebreakers functioned and mobilized in became crucial to their actions. Public opinion and campus involvement during World War II shaped their outlook on the conflict. Academic institutions, like Winthrop College, exposed these young women to tools to help in the war effort through social programs and conflict focused courses. The college campus functioned as an environment susceptible to organizational duty based on communal needs and goals. Pearl Harbor caused America to enter the war officially and served as a distressing call to arms for some of these future cryptologists. The actions by the Japanese military revved up these women, and unfortunately, racial tensions seized some of the cryptologists. Setting the stage further for upcoming codebreakers, having loved ones in the military while attending college, and working with the United States government pushed their need to end the conflict in a quick manner.

Chapter 3: The Chosen Ones

During World War II, young educated women were chosen through their academic institutions, volunteered as civilians, or enlisted in the armed forces through the Women Accepted for Volunteer Emergency Service (WAVES) or Women's Army Auxiliary Corps (WAAC). Women utilized many different avenues when joining to assist with the war effort, venturing into relatively new territory. This chapter explores the issues and negativity surrounding the creation and existence of these organizations throughout their participation in the war effort. Female admittance into the armed services was soured by misogyny and undesirable responses from their families and the public. Cryptologic departments in both the Army and the Navy referred to rigorous criteria when fielding applicants for their clandestine programs. Crypt sectors relied heavily on a women's integrity and secrecy. They also were interested in how the women looked and with whom they associated with. College campuses became the perfect environment for recruiting the right type of woman. Lastly, this chapter discusses the codebreakers' reasons for joining the war effort, ranging from patriotism to better wages. Those chosen, whether it be through letters or applications, were young women looking to engage in the war effort while bettering their standings along the way.

The government directly recruited female codebreakers during World War II through letters sent to students on campuses and college graduates. Letters to college-aged women began as early as November 1941, coming from the United States Navy to campuses across the nation.[58] Academia provided access to educated women, some with

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[58] Mundy, *Code Girls*, 3.

prior training in cryptology through courses at their institutions. Most were young and

unattached, making them the perfect candidates to pick up and venture out. Their status

as students and graduates demonstrated that they were able to receive and comprehend

extensive training in a relatively short amount of time.

After Pearl Harbor, letters began filing out with much more fervor in 1942, 1943,

and 1944. Helen R. Allegrone, while a senior at Radcliffe College, was contacted by the

government. She received correspondence asking if she would take a course in

cryptology and join one of the women's branches of the armed services.[59] Others

encountered recruitment after they graduated from the academy. Winthrop College

graduate Jeuel Bannister Esmacher was shocked and thrilled when she received her

recruitment letter.[60] Another, Ann Caracristi was contacted by the government after she

graduated from Russell Sage College in 1942. The Army sent letters to various colleges

asking deans for recommendations of women who could do this type of clandestine

work.[61] Letters received by collegiate cryptologists helped ease their entry into the war

effort, and their response revealed a willing young conglomerate, ready to participate in

the ongoing conflict.

After graduation, young women also sought out enlistment into the armed

services and cryptology departments through volunteering. They had the skills to help

their nation and felt that they could be useful. For example, Winthrop graduate Sara

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[59] Allegrone, Women Veterans Historical Project.
[60] Esmacher, Louis Pettus Archives.
[61] Ann Caracristi, interview by R.D. Farley, July 16, 1982, transcript, National Security Agency,
https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/oral-history-
interviews/NSA-OH-15-82-caracristi.pdf.

Stringfellow approached cryptanalysis in an alternative way. Stringfellow, after completing the cryptology course at Winthrop and graduating, took a month off and then applied to the Army's Signal Corps. She remembered their course instructor, Dr. Ruth Stokes, telling the students about work in the Army's intelligence community and recalled how she encouraged the girls to go to Washington to use their skills.[62] Juanita Moody also took it upon herself to approach cryptography. She ventured into her local Charlotte, North Carolina recruiting office, volunteered, and asked to work in the intelligence sector.[63] When not recruited directly via their institution, women reached out on their own volition.

College women independently volunteering for the armed services or the Army and Navy cryptology departments were possibly influenced by advertisements and armed forces presence on campus. In 1943, *The Johnsonian,* Winthrop College's student newspaper, ran an army announcement directed toward college women in their senior year. The advertisement, decorated with sharply dressed women in Women's Army Auxiliary Corps uniforms, was searching for "alert college women" who were looking for adventure, experience, and good pay.[64] Winthrop was also visited by a Women Accepted for Volunteer Emergency Service member. Ensign and Winthrop alumni Katherine Adams advertised the WAVES multiple times during her visit, as documented by *The Johnsonian*. According to the article, she claimed that, "the main thing I've got to say is —We want some of you in the WAVES. What's keeping you out? It must be

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[62] Stringfellow, Louise Pettus Archives.
[63] Moody, National Security Agency.
[64] "U.S Army Announcement: To College Women in their Senior Year," *The Johnsonian*, January 22, 1943, https://digitalcommons.winthrop.edu/thejohnsonian1940s/54.

boyfriends!"[65] Adams further explained the advantages of joining the nation's armed forces, experience, and a chance at leadership in officer positions. Recruitment of young educated women occurred on campuses, even if it wasn't in the form of specific correspondence.

Winthrop College girls found their way into cryptology through the courses at their institution or enlistment. Many of the girls went on to work in the Japanese sector and ventured to different military establishments across the nation. Sylvia "Dutch" Ness Rossenwasser, Maud Gladden Nims, and Lillian Kirby Arrants enlisted in the WAVES and worked for the Navy cryptology department. Arrants and Rossenwasser were both stationed in Washington, D.C., and worked to gather information from incoming Japanese codes. Alumni Mary Ellen Adams Miller was working as a teacher when her husband volunteered for the Army's cryptanalysis sector. Miller left behind her teaching career when the couple moved to Bradenton, Florida, where her husband began receiving training. After his departure to Europe, Miller joined the Army's Signals Intelligence Service (SIS). Some Winthrop codebreakers stayed on past their initial duration. India Williams Cudd and Jeuel Bannister Esmacher continued their work as cryptographers after the end of the war, with Cudd eventually retired from her position in cryptology. One Winthrop student, Helen Gore Anderson, served as a training instructor while working as a cryptologist.

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[65] "Former Winthrop Student "Plugs" For The WAVES," *The Johnsonian*, February 24, 1943, https://digitalcommons.winthrop.edu/thejohnsonian1940s/57.

Women also became involved with cryptanalysis through enlistment with the military through the United States Army's Women's Army Auxiliary Corps, later changed to Women's Army Corps (WAC), and the Navy's Women Accepted for Volunteer Emergency Service. During World War II, women joined and served with the armed forces in an official capacity. This allowed for women to assist the war effort actively. They signed "for duration," sometimes with an added six months, and were used to take the place of men who could fight on the frontlines. The WAACs and WAVES programs received varying degrees of support. In December 1941, when asked if they would be in support of a draft for single women between the ages of 21 and 35 to train them for wartime jobs, the public responded with 68% in favor.[66] Women surveyed responded with 73% in favor of and women aged 21 to 35 responded with an overwhelming 75%, agreeing with the idea of a draft for their age range.[67] American citizens seemed keen on allowing women to participate through the military in wartime occupations, and women were eager to contribute in any way possible. However, while some supported female armed serves programs, others did not, and the codebreakers involved with the WAACs and WAVES faced struggles in the steps leading up to their armed service creation and through negative rumors cast upon them.

The WAACs had a contentious and groundbreaking beginning. In 1941 Congresswoman Edith Nourse Rogers attempted to introduce a bill in the House of Representatives to establish the Women's Army Auxiliary Corps.[68] Support was low, and

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[66] Gallup, *The Gallup Poll*, 316.
[67] Gallup, *The Gallup Poll*, 316
[68] Bettie J. Morden, *The Women's Army Corps, 1945 – 1978* (Washington D.C.: Center of Military History United States Army, 1990), 3.

minds were elsewhere, leading to the bill's quiet disappearance. However, in early 1942, Congresswoman Rodgers attempted to revive the idea for female involvement in the Army in noncombat roles. In this revised bill, she added that women would enjoy the same military status that men did. The idea of women joining to ease the strain of manpower was generally accepted, but the notation to give these interlopers the same military status, rights, and benefits as their male counterparts met opposition.[69] Rodgers was not the only entity interested in creating a female attachment for the Army. First Lady Eleanor Roosevelt and General George C. Marshall both made suggestions on women's involvement in the military.

On May 14, 1942, Congress passed a bill that would create the Women's Army Auxiliary Corps but excluded their members from military status. This led to women serving alongside the military and not serving with. President Roosevelt followed suit in acceptance the next day, by signing the passage of Public Law 554, permitting for the creation of the WAAC. This organization was capped at a 150,000 personnel limit and had different rank titles when compared to their male Army counterparts.[70] However, their military status would soon change and be a lesson for the Navy, creating their upcoming WAVES program. Just a year later, the WAAC women would receive Army status. In 1943 the second "A" in WAAC was dropped, creating the Women's Army Corps, or WAC. Still, issues with the program remained. The organization's commanding officer was not promoted above the rank of colonel and its other officers above the rank

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[69] Morden, *The Women's Army Corps*, 4.
[70] Morden, *The Women's Army Corps*, 12.

of lieutenant colonel. Also, its officers could never command any men unless explicitly permitted by Army superiors to do so.[71] Gender bias remained even in times of war.

The Women Accepted for Volunteer Emergency Service was established two months later in July of 1942 after much resistance and squabbling. Rear Admiral Chester W. Nimitz, head of the Bureau of Naval Personnel, was uninterested in letting women into the Navy and other bureaus responded in kind. The only encouraging responses received were from the Bureau of Aeronautics and the Chief of Naval Operations.[72] Also, the push for a naval branch for women was, once again, aided by Mrs. Roosevelt and the Navy's Women's Advisory Council headed by Margaret Chung. Female inclusion into the Navy was not deemed auxiliary, like the WAAC. From the start, women would be strictly regulated and subjected to military rules, regulations, and discipline.[73]

The Navy and the WAVES had a deep connection to academia and college campuses during World War II, especially when it came to recruiting codebreakers. The Navy had already been searching the academic community for men with scientific and mathematical talents for their programs. Now the distinguished and educated women of America would be included in their quest.[74] Educated women were seen as reliable, professional, and skilled. College campuses were the perfect place for gathering recruits and coming into contact with women with degrees in higher education. The relationship

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[71] Mattie E. Treadwell, *The Women's Army Corps: The United States Army in World War II* (Washington D.C.: Center of Military History United States Army, 1991), 220.
[72] Susan H. Godson, "The Waves in World War II," in *Women in the Navy: The History*, ed. Thomas J. Cutler (Annapolis, Maryland: Naval Institute Press, 2015), 53.
[73] Godson, "The Waves in World War II," 55.
[74] Jean Ebbert and Marie-Beth Hall, *Crossed Currents: Navy Women from WWII to Tailhook* (Washington: Brassey's, 1994), 32.

to the academy was more profound than just acquiring acceptable educated women from college grounds. Important female participants in the conception and leading of the WAVES hailed from academia. Elizabeth Reynard, who coined the name for the WAVES, was an English professor from Barnard College. Mildred McAfee, who was director of the program, was president of Wellesley College. Most WAVES women were stationed for boot camp and training on college campuses because of the "dignity of the academic setting and because of the readily available facilities."[75] College campuses served as valuable training and recruiting gold mines. They were a concentrated area of educated women, willing to help their country.

The WACs and WAVES experienced a myriad of issues, ranging from misogyny, a slander campaign, codebreakers negative familial reactions, and the almost insulting nomenclature of these organizations. Females serving in the military caused quite a stir for some, including politicians and male military officials. A congressman from Massachusetts argued that women should not be serving in the military because it would corrupt their femininity and negatively impact their future as mothers.[76] The Navy was uninterested in allowing female personnel to serve in their ranks. The chairman of the House, Naval Affairs Committee, was reportedly, "anything but enthusiastic about putting women in uniform."[77] In 1943 the WACs were on the receiving end of slanderous gossip, leading some to believe that they were sexually promiscuous. An article by John O'Donnell falsely claimed that the War Department made a deal with the Army women

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[75] Godson, "The Waves in World War II," 57.
[76] Ebbert and Hall, *Crossed Currents*, 31.
[77] Ebbert and Hall, *Crossed Currents*, 31.

and would be issuing WACs contraceptives, stimulating a public outcry against females

serving in the armed forces. These instances harmed the WACs and WAVES, who were

often held to higher moral standards than their male counterparts. [78] Controversies

clouding the organizations led to women steering clear due to the harmful stereotypes,

and some joining faced criticism from their families.

At times, the chosen codebreakers engaging with the WACs and the WAVES

experienced adverse reactions from their families. Cryptologist Betty Hyatt Caccavale

recalled her mother's unfavorable response to her signing with the WAVES. She received

worried lectures stating that there would be difficulties surrounding her military service.

Some may not think of her as a good or moral person due to her time in the armed

services.[79] Myrtle Hanke experienced a similar reaction when she broke the news to her

father that she was going to become a WAVE. She stated that her father "knew what kind

of women went into the service"[80] and he was worried that she would become some sort

of camp follower. However, her mother signed the papers, and Hanke was on her way to

becoming a military woman.

Mary White Gettys was applauded by her family when she became a WAVE, but

she remembered different reactions for friends and disapproval from the public on their

decisions to serve. Their families would not have such a thing, and they did not think

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[78] Lisa D. Meyer, "Creating G.I. Jane: The Regulation of Sexuality and Sexual Behavior in the Women's Army Corps during World War II," *Feminist Studies*, Vol. 18, No. 3, The Lesbian Issue (Autumn, 1992): 587, https://www.jstor.org/stable/3178084.
[79] Elizabeth Hyatt Caccavale, interview by Eric Elliot, June 18, 1999, transcript, Women Veterans Historical Project, http://libcdm1.uncg.edu/cdm/singleitem/collection/WVHP/id/4259/rec/1.
[80] Hanke, Women Veterans Historical Project.

women belonged there. Gettys claimed that the women received a lot of criticism for joining, and said the public asserted that, "they didn't join for patriotic reasons, they joined it to follow the men wherever they were."[81] Even her husband had previously declared he would never marry a WAVE. Codebreakers who were willing to help during the war suffered from negative feedback due to their involvement with the armed services, often as a result of their perceived intimacy with the men in the same branches.

The female cryptologists and enlisted women recognized the carefully worded names their programs were given. As previously mentioned, the WACs were originally Women's Army Auxiliary Corps, before dropping the "auxiliary" terminology in 1943. The auxiliary represented their supplementary and secondary standing within the armed forces. At their conception, they were seen as another sector, distant from their male contemporaries. They existed as extras or reserves before their conversion into active duty. The language chosen to describe the organizations directly commented on their tentative and temporary existence at the beginning of World War II. As the war continued, their roles evolved.

Enlisted women themselves were aware of the apprehensive male officials within the armed forces. When creating the name for the women in the Navy's Women Accepted for Volunteer Emergency Service program, Elizabeth Reynard stated that she included the word "emergency" to "comfort the older admirals, because it implies that we're only a temporary crisis and won't be around for keeps."[82] WAVE codebreaker

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[81] Mary White Gettys, interview by Miciah Bennett, October 14, 2009, transcript, Louise Pettus Archives and Special Collections, https://digitalcommons.winthrop.edu/oralhistoryprogram/280/.
[82] Yellin, *Our Mother's War*, 137.

Gettys commented on the name stating that it was significant and coined to demonstrate that women were fleeting entities within the forces, however "that didn't work out, there are more every day joining the Navy."[83] Once conquering the contentious process of their program's conception, dealing with the sour reaction of loved ones and the public, and coming to terms with their temporary presence, WAC and WAVE codebreakers faced the strict standards of entering the cryptography department.

The United States Army and Navy were searching for a specific type of young women to fill their cryptography sectors. World War II female codebreakers had to meet criteria that ranged from character and moral integrity, looks, to skills gained in training or college. However, a girl's truthfulness and loyalty to the United States was paramount in the searching process. Codebreaking abilities could be taught in a classroom through training and hands-on work, but honesty could not. While recruiting women for the Navy's cryptologic office, Captain Laurance Safford stated that, "…it is essential that all personnel be especially selected for integrity. Individual qualifications are of secondary concern and used only as a basis for assignments after integrity has been established."[84] The sensitive nature of the work required a workforce of high moral character, a steely ethic code, and faithfulness to their home nation. Women involved with the Army crypt sector were sought based on four essential characteristics.[85] Individuals needed to be of "excellent character" and preferably a native of the United States. They were personnel who had no close connections with foreigners in America or in other countries. Their

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[83] Gettys, Louise Pettus Archives.
[84] Wilcox, *Sharing the Burden*, 3.
[85] Wilcox, *Sharing the Burden*, 4.

dependability and trustworthiness were unchallenged and solid. Lastly, these individuals

needed a secure financial standing, to avoid monetary enticement from enemy nations

and actors.

Actively finding and recruiting codebreakers was a difficult task for both the

Army and the Navy. The secrecy of the project made it difficult to publicly advertise,

unlike their contemporaries in the defense industry. It was difficult to relay information to

a young woman being scouted to work in cryptography, because she may fail the rigorous

checks and compromise the program. Most girls did not know what they were applying

for or what sector of the branch they were being sent to unless they had some prior

knowledge. Many, like WAC Mary Johnston, were told to pack their things and head to

Washington, D.C., with little more instruction than that.[86] Johnston and the small number

of girls that accompanied her were not told what they would be studying, had their

physicality examined, went through multiple background checks, and signed forms

detailing the seriousness of their future operations upon arrival. They later learned that

their personal information had been checked by four different organizations: The Federal

Bureau of Investigations (FBI), Military Intelligence (G-2), Post Finance, and even a

private detective agency.

Other cryptologists dealt with multiple security checks and vague information

about their assignments as both military personnel and civilians. When Moody

volunteered in 1943, she was sent to a school to train while awaiting clearance. She stated

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[86] Mary B. Johnston, "The WAC as Cryptographer," in *A Women's War Too: U.S. Women in the Military in World War II*, ed. Paula Nassen Poulos (Washington, D.C: National Achieves and Records Administration, 1996), 85.

that her authorization came through in three weeks because a man working with the upper

echelon of the government came from her home county and vouched for her, claiming

she was "clean as a whistle."[87] Erma Hughes Kirkpatrick also experienced security

checks during her application process. Individuals from the FBI came down to her

neighborhood to search for any issues with her integrity or trustworthiness.[88] Another

codebreaker, Jaenn Bailey, and her family had contact with FBI agents questioning her

identity and birthplace. A car pulled up outside of their home, and men emerged flashing

their badges, requesting information about Bailey. They "grilled" her aunt, who nearly

had a heart attack at the sight of FBI agents at their front door, to make sure Bailey was

who she alleged to be and was born where she claimed to be in her documents.[89] The

Army and the Navy were careful with whom they employed in their cryptography

programs. Many codebreakers were in the dark about their unit or service and

participated in multilevel background checks filled with extended criteria based on their

character.

The armed forces delved into physical appearance, too, when fielding possible

codebreakers during the war. The Navy was the branch that cared about the social status

and looks of the female cryptologists they were commissioning.[90] Some naval

applications asked women to include passport photos to see what they looked like. The

care toward appearance should not be a shock when dealing with the Navy. Their stylish

dark blue wool WAVES uniforms were designed by the French New York based fashion

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[87] Moody, National Security Agency.
[88] Kirkpatrick, Women Veterans Historical Project.
[89] Bailey, Women Veterans Historical Project.
[90] Mundy, *Code Girls*, 15.

label, Mainbocher. The brand, at the time, was clothing Gloria Vanderbilt, C. Z. Guest, Babe Paley, and Doris Duke. The beautiful uniforms charmed individuals so much that one codebreaker stated that she joined the WAVES over the WACs because she "couldn't imagine wearing khaki."[91] Aside from integrity, some young female codebreakers were analyzed and judged based on looks. This ideology corresponds with women wearing makeup in factories, working in the defense industry and propaganda, for both workers and female military personnel. After all, it was the male gaze that was sifting through applications and hiring women.

Aside from taking a course in cryptography while at college, the topic in which codebreakers spent their academic years studying was an important indicator of their skill sets. The recruited girls and accepted volunteers, for the most part, studied similar majors at college. Most female cryptologists majored in some type of mathematics, language, or music. Knowledge of these subjects was helpful for codebreaking in many ways. Mathematics allowed the girls to work with and identify placeholders when decoding enemy messages. Skills in both music and math permitted for pattern recognition, something necessary for cryptology. The existing familiarity of other languages helped codebreakers slog through ciphers and distinguish foreign terms when decoding. Winthrop graduates Sara Stringfellow and Esmacher majored in topics that assisted their cryptanalysis abilities. Stringfellow was a double major, English, and French, while Esmacher studied piano and music education. Elizabeth Corrin, a math major from Massachusetts, recalled recruiters on her campus. She claimed they were looking for

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[91] Hanke, Women Veterans Historical Project.

"bright women."[92] When conscripting women and fielding volunteers for their cryptology

sectors, the Army and the Navy considered skills acquired during their college careers.

Intelligent students who studied and excelled in mathematics, languages, and music were

attractive recruits for these programs.

Female codebreakers had many reasons for accepting recruitment letters,

volunteering, and joining in the fight during World War II. One primary motivation was

patriotism. The nation and society around them were participating in every way possible.

Citizens were fighting in the war, rationing, working in the defense industry factories,

and buying war bonds. America was rallying around a single cause, a cause that

collegiate cryptologists felt strongly about. Hanke described a "yearning"[93] to do

something and stated that patriotism was a significant factor in her enlistment in the

WAVES. Helen M. O'Rourke also felt the pull of nationalism when recruited. She

recalled being "very enthused and dedicated,"[94] saying that helping was the right thing to

do. The female cryptologists of World War II were heavily influenced by patriotic

ideologies and sentiments when entering the war effort. To triumph in the conflict, all

hands were required on deck, even female hands.

Others, like Georgia Ludington, joined for the experience and adventure that the

opportunity offered. Young women were able to travel far from home and function with a

certain degree of independence. They were able to test themselves and their skills outside

[92] Elizabeth Corrin, interview by Jennifer Wilcox, Carmella Leumas, and Jimmie Collins, February 8, 2002, transcript, National Security Agency, https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/oral-history-interviews/nsa-oh-2002-06-corrin.pdf.
[93] Hanke, Women Veterans Historical Project.
[94] O'Rourke, National Security Agency.

of the typical setting and career path. Ludington was interested in the physical and mental tests that were required, the uniforms, and thought that traveling would be fun.[95] Joining the war effort as a civilian, a WAC, or a WAVE was seen as a better opportunity when compared to careers available for women at the time. Female cryptologists were women who were fresh out of college or already employed as schoolteachers or secretaries. Cryptology offered a new and exciting experience, an experience that often paid better than their existing career. More money meant freedom and power for these young women. The seeds of modern feminism were plated in the minds of young recruits.

Those chosen, either through their own volition in the form of independently joining or by active recruitment through higher education institutions, turned out to benefit the war effort. The creation of the WAVES and the WACs, a driving force in many of these women's war experiences, was surrounded by issues. Allowing female involvement and status in the armed forces was a quarrelsome but important decision. It bumped up against many old ideologies, but the need for manpower prevailed. Women involved with the Army and Navy cryptology departments underwent security checks and rigorous criteria when being considered for crypt programs. Nevertheless, codebreakers continued to seize these opportunities for patriotic reasons, travel, experience, and better pay. Winning the war meant that both genders would contribute their expertise.

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[95] Ludington, National Security Agency.

Chapter 4: Academic Patriots

During World War II, young women began helping the war effort from college campuses across the nation. Academic institutions maintained close relations with both the Army and Navy. The armed forces worked with colleges to permit programs, like cryptanalysis courses, on school grounds. They also functioned as facilities for WAVES and WACs basic training. At Winthrop College, an armed force's presence existed in the form of the male Army Air Cadets. However, Dr. Ruth Stokes of the math department was instructing secret courses in cryptology. Stokes took these courses as a top priority and was considered a significant influence on the girls who went to Washington. Unfortunately, not all would enjoy the instructor's enthusiasm. Stokes would have lingering issues with academic officials at Winthrop. Stokes began pushing for more funding and instructors, resulting in soured relations with college administration. This would lead to her departure in 1946. This chapter briefly covers other academic insinuations and their involvement with Army and Navy programs. Codebreakers experienced their first encounter with cryptology, some falling in love with the practice. Classes exposed the skills needed, dedication, and, most importantly, the secrecy required. While the world was at war, college campuses across the nation were gearing women up academically and physically.

Colleges had strong ties to women entering cryptology and war during the conflict. Not only did they stand as a recruitment center for Army and Navy cryptology departments, but they also served as training grounds for codebreakers who joined military ranks. Academic institutions, like Winthrop College, cooperated with the War

Department to create cryptology courses that would be available on their campuses. Colleges had the perfect surroundings, personnel, and need for war-focused and funded courses and programs. They possessed the learning accommodations, the willing professors, and a wealth of intelligent and morally sound students who were ready to help. These courses were used as steppingstones from academia, to official military schooling, to directly impacting the ongoing conflict in various armed forces' cryptology sectors. Institutions served as the middleman for recruitment and a place for training, both on an academic level and a physical level.

Campuses also functioned as armed services training facilities for incoming WACs, WAVES, and male military forces. Colleges contained dormitories and the facilities, like classrooms and gymnasiums, that these programs needed. They were readily available and already existing establishments, so the need to move female service members or the influx of men due to the draft into other military training facilities was not necessary. As the war raged on, college campuses across the nation became more and more militarized.[96] The presence of military personnel marching around campus, saluting those walking by on their way to class, and young women quietly scuttling off to their cryptanalysis lessons became normal during this period. The academy shifted and reformed itself toward the war effort, but not without a little bit of incentive.

World War II interrupted many aspects of life, including the established campus status quo. However, some positives emerged from this national crisis. As male students

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[96] Charles Dorn, "A Woman's World": The University of California, Berkeley, During the Second World War," *History of Education Quarterly*, Vol. 48, No. 4 (Nov., 2008): 535, https://www.jstor.org/stable/20462258.

began departing for war, they also began leaving behind college campuses and, most importantly, tuition payments. Academic institutions, realizing the loss of revenue, negotiated agreements with the armed forces to create classes and allow training programs on college campuses.[97] This would help recoup that loss of revenue due to shrinkage in their male population on campus and permit for a rise in women on campuses. Through payments distributed by the government, colleges created an atmosphere of acknowledgment of the situation overseas and allowed students to learn new skill sets. With men departing academia for war, positions and opportunities sprung up for women. During World War II, it was an all hands-on deck ideology. Women were encouraged to take part in programs that focused on wartime employment, including courses focused on mathematics, chemistry, and physics.[98] They filled roles in classes and administration that were left behind as males exited.

The mathematics department at Winthrop College became fully invested in the war effort. Courses like cryptanalysis and classes in astronomy and navigation were offered to the students and Army Air Cadets stationed on campus. Department head of Mathematics and Astronomy, Dr. Ruth Stokes, was instrumental in getting these courses off the ground and integral in influencing young women to join Army intelligence programs. Stokes was also one of the first in the nation to respond to the American Astronomical Association's call for training Army Air Corps pilots.[99] She fought to keep programs going and tried to bring more war-related courses onto Winthrop's grounds.

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[97] Dorn, "A Woman's World," 535.
[98] Dorn, "A Woman's World," 538 – 540.
[99] Susanna O. Lee, "Dr. Ruth W. Stokes" (2016*), From Winthrop to Washington*, Louise Pettus Achieves, https://digitalcommons.winthrop.edu/winthroptowashington/21.

However, not all were happy to aid the war effort on Winthrop's campus. Due to the presence of men at an all-female college, some resisted the cadets' existence on campus. Senator Q.E Britt of York County called for the "removal of the armed services" from the college, and some members of the Board of Trustees began expressing their dissatisfaction with the cadets.[100] The schools stated that the men on campus were restrained and respectful in their actions, causing no issue. Nevertheless, when the War Department discontinued the Air Cadet program, Winthrop was "proud"[101] to have participated in the war effort, never mentioning the cryptanalysis course.

Winthrop's cryptanalysis course set up and trained young women for participation in World War II. The United States Army approached the college on this matter, starting the cryptology classes and the Army Air Cadet program. No formal prerequisites were required, but it was only made available to seniors and juniors who would leave before graduation. Students with early graduation dates or departure were seen as valuable due to their impending exit from academia, freeing them up for Army cryptology sectors. The first class began in 1943 and was filled with thirty-four seniors, and according to Stokes, thirty-three of those young women were offered employment with the Signal Corps.[102] The last student was denied a chance at placement due to foreign background; one of her parents was Syrian.

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[100] Webb, *Winthrop University*, 134.
[101] Webb, *Winthrop University*, 133.
[102] Dr. Ruth Stokes to President Shelton Phelps, 1943, President Shelton J. Phelps Papers 30 May 1943 – 8 Dec. 194, Louise Pettus Archives, Rock Hill, SC.

Winthrop University has estimated that 60 to 100 girls took part in the cryptanalysis course. Jeuel Bannister Esmacher remembered the lectures and assignment format the courses followed.[103] Classes functioned around instruction by Stokes, who often taught the courses concerning cryptology. Students would finish practice assignments, return to class, grade their work themselves, and then the instructor would go over them in class. Esmacher remarked that the work was similar to doing a crossword puzzle. Stokes argued that the young college girls went into cryptology work for mostly patriotic reasons. Additionally, there they were amply compensated. She claimed that those offered a spot in the Army's cryptology sector were offered an initial salary of $1970, with the minimum salary being $1950.[104] Stokes saw the positive impact these courses could have on women during World War II. They could gain new skills and be salaried in a fair way, compared to their current income.

Dr. Ruth Stokes was a mathematician, department head, cryptanalysis course instructor, and patriot. Stokes, a Winthrop graduate and South Carolina native, started her teaching career in Denmark, South Carolina. She began teaching 12th-grade mathematics, served as a principal, professor, and department head throughout her decades' long career. During her college career, she held interests in astronomy and mathematics.[105] Stokes was an incredible influence on her students in the cryptanalysis class and their cryptology careers. Both Stringfellow and Esmacher remembered her fondly. Stringfellow claimed that Stokes was the "most influential professor" and recalled how she would encourage

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[103] Jeuel Bannister Esmacher, interview by author, South Carolina, November 22, 2019.
[104] Stokes to Phelps, 1943, Phelps Papers.
[105] Judy Green and Jeanne LaDuke, *Pioneering Women in American Mathematics: The Pre – 1940 Ph.D.'s* (Providence, RI: American Mathematical Society, 2009), 294.

her students to apply for jobs in Washington.[106] However, others had different

perceptions of Stokes. She often bumped heads with college officials, sometimes over the

cryptanalysis class.

Relations with Stokes and Winthrop College officials would sour over issues

within the mathematics department. In 1943, just one year after the creation of the

cryptanalysis course and in the same year it began, the instructor attempted to persuade

college officials into hiring an additional teacher for the department. Stokes accused

Winthrop administrative officers of sabotaging enrollments into the math major by

diverting students and courses to other disciplines within the institution.[107] Stokes was

worried that taking away classes with high enrollment and great interest, like the

cryptanalysis course, would be detrimental to the longevity of the department and the

training of the students. She stressed the importance of mathematics to the war effort. She

claimed that every academic institution in the state and the nation was adding additional

courses to meet the demands of the War Department. In the department head's opinion,

three instructors were not enough to handle the regular load and the crucial tasks placed

upon them by the federal government.[108] An additional instructor would lighten the load

tremendously.

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[106] Stringfellow, Louise Pettus Archives.
[107] President Phelps Administration, Miss Stokes' Request for an Additional Teacher of Mathematics at Winthrop College, August 10, 1943, President Shelton J. Phelps Papers 30 May 1943 – 8 Dec. 1943, Louise Pettus Archives, Rock Hill, SC.
[108] Dr. Ruth Stokes to Mr. W.J. Roddey, July 27, 1943, President Shelton J. Phelps Papers 30 May 1943 – 8 Dec. 1943, Louise Pettus Archives, Rock Hill, SC.

By August of 1943, Stokes was fighting a losing battle against the bureaucracy of academia. At the time, thirty-five students[109] were listed as enrolled in the cryptanalysis class, and Stokes was working to save it from leaving for another department. In a report, Interim President Mowat G. Fraser claimed that any department could teach the course. He stated that it was not inherently related to mathematics and did not need to be made readily available to students.[110] She stated that the assertion that it had nothing to do with mathematics was "untenable."[111] Also, in her rebuttal letter back to the administration, Stokes argued that requesting another instructor to create an "adequate staff" to do the work anticipated by students, parents, and the War Department was not far out of the realm of possibility. Stokes further criticized the college administration for what she perceived as inactivity with the war effort and subduing the mathematics department. She was interested in bringing another war program onto campus; in the summer, Winthrop had a chance to get a fully paid unit of around fifteen female trainees in engineering for the United Air - Craft Corporation.[112] However, Fraser deemed that the college was already offering too much mathematics, stating that this department could not override the needs of smaller programs and the college as a whole. The cryptology course would officially end operations on Winthrop's campus by the spring of 1945, and as previously noted, Dr. Ruth Stokes would depart shortly after.

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[109] Miss Stokes' Request for an Additional Teacher of Mathematics, August 10, 1943, Phelps Papers.
[110] Interim President Mowat G. Fraser to Dr. Ruth Stokes, August 10, 1943, President Shelton J. Phelps Papers 30 May 1943 – 8 Dec. 1943, Louise Pettus Archives, Rock Hill, SC.
[111] Mowat to Stokes, August 10, 1943, Phelps Papers.
[112] Miss Stokes' Request for an Additional Teacher of Mathematics, August 10, 1943, Phelps Papers.

Even during a global-scale conflict, Stokes was unable to escape administrative issues and heat from superiors due to her demands to grow the mathematics department. On July 5, 1946, Stokes received a letter from Winthrop President Henry R. Sims stating that, "after very careful and serious consideration, I have concluded that the best interests of Winthrop College will not be served by a continuation of your connection with the institution."[113] Sims advised her to submit her resignation after completion of her summer 1946 courses. Since no previous notice was offered to Stokes before her forced departure, the college would extend a year's salary to the instructor. Ending the letter with a scathing reprimand Sims stated that he would not go into detail as to why Stokes was being asked to leave but declared that she should hardly be unaware. He claimed that her actions and statements during her tenure at Winthrop revealed that she was" out of harmony and agreement with the policies and operation of the College." He went on to claim that her criticism had fostered "friction, suspicion, and discord" among her associates and even students.[114]

After she departed from the campus, Stokes moved to Syracuse University in New York. She refused to take the parting gift check that was offered by Winthrop, returning it to officials after they attempted to mail it to her.[115] Even after leaving Winthrop's campus, Stokes still was seen as unfavorable. In a 1948 telegram, two years after her sendoff, President Sims received a message with information on an article that

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[113] President Henry R. Sims to Dr, Ruth Stokes, July 5, 1946, Ruth W. Stokes Papers, Louise Pettus Archives, Rock Hill, SC.
[114] Sims to Stokes, July 5, 1956, Stokes Paper.
[115] President Henry R. Sims to Dr, Ruth Stokes, July 29, 1946, Ruth W. Stokes Papers, Louise Pettus Archives, Rock Hill, SC.

had mentioned Stokes. The telegram sender referred to Stokes as the "battle-ax"[116] and

Sims responded with a joke that she had must have a good public relations agent and that

she had indeed run her course at Winthrop.[117] Dr. Stokes worked diligently to foster the

war effort on Winthrop's campus, and according to a selection of her cryptanalysis

students, she was an incredible instructor and inspiration. However, issues with

administration cut her time short at the college.

Other academic institutions across the nation offered courses in cryptology during

World War II. For example, at Goucher College in Baltimore, Maryland, English

professor Dr. Ola Winslow taught top-secret classes in a locked room in Goucher Hall.[118]

Elizabeth Corrin recalled the Navy's presence on campus and the cryptology course she

took while at school in Massachusetts. In 1943, Corrin's college offered a course that she

enrolled in her senior year that covered ciphers and encoding.[119] She and her classmates

received college credit for the class, and it facilitated their move from academia to

Washington. Corrin enlisted in the WAVES, and while in officer training, she inquired

about other positions, but she was assigned to the cryptology sector anyway, most likely

due to her prior training. However, not all codebreakers participated in cryptanalysis

courses at their colleges. Enlisted women that joined the WAVES and WACs received

cryptographic and physical training in the form of boot camp on college grounds.

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[116] Mr. C.L. Cobb to President Henry R. Sims, telegram, October 13, 1948, Ruth W. Stokes Papers, Louise Pettus Archives, Rock Hill, SC.
[117] President Henry R. Sims to Mr. C.L. Cobb, telegram, October 14, 1948, Ruth W. Stokes Papers, Louise Pettus Archives, Rock Hill, SC.
[118] Wilcox, *Sharing the Burden*, 6.
[119] Corrin, National Security Agency.

Women involved in codebreaking did not have to take a course at their colleges while enrolled. WAVES and WACs participated in training on college campuses across the nation. There, women learned military basics and received some training in cryptology before moving on to their next destination. Erma Kirkpatrick attended basic training for the WAVES at Smith College in Massachusetts.[120] Kirkpatrick was schooled on making beds, doing whatever an officer says, and received instruction on how to march and salute. The training was supposed to last longer, about eight weeks, but Kirkpatrick re-assigned. She was only at Smith for about four weeks before the need elsewhere grew, and she returned to Washington. Myrtle Hanke, who did not attend college, was stationed at Iowa State Teachers College in Cedar Falls for basic training.[121] She recalled them all being "green" and stated that they were the first officers training there in the history of the program. Ann Caracristi graduated in 1942 and headed to training at George Washington University.[122] She was sent a copy of William Freidman's *Elements of Cryptanalysis* with a request to read it before arriving on campus. Caracristi stated that they were taught basic crypt in a classroom for about four to five weeks. Her instructor at George Washington, a woman named Evelyn Akely, was only one lesson ahead of the class she was teaching.

Even while operating on college campuses, cryptology programs were concerned with high levels of security. Classes were often omitted from the curriculum catalog and disguised as math courses. At Winthrop College, the confidentiality of the courses was

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[120] Kirkpatrick, Women Veterans Historical Project.
[121] Hanke, Women Veterans Historical Project.
[122] Caracristi, National Security Agency.

maintained. There is no evidence of the cryptanalysis course in the catalog for any of the years it was available; it remained unlisted and hidden in plain sight. No official class roll was ever kept for the classes, and many students did not talk about it on campus. Winthrop's hushed and careful treatment of the cryptanalysis program was not unwarranted. If academic institutions spoke out about these clandestine programs, punishments were absolute. For example, Brown University and Pembroke were both blacklisted from the program due to a professor bragging about the course.[123] The secrecy enforced by the armed services on campuses trained the young women for future security measures in the official Army and Navy crypt sectors. "Loose lips sink ships" refers to cryptology as well as military actions.

College campuses stood as facilitators for many young women during World War II. They offered cryptanalysis training and served as areas where WAVES and WACs ventured into their first military experiences. Winthrop filtered female students through the lecture-assignment based course, allowing them to familiarize themselves with a new and essential skill. Other select academic institutions hosted similar classes in their lecture halls; students were careful of what little information they let slip out the door. Keeping quiet about cryptanalysis courses was paramount. They were often not listed, and those that spoke out faced penalties for their indiscretions. After training on college campuses, codebreakers, who were recruited or volunteered, began traveling to their sector headquarters, and their adventure into cryptology was indeed underway.

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[123] Mundy, *Code Girls*, 15.

Chapter 5: From College Campuses to Government Buildings

Once gaining the rudimentary amount of training and discipline taught at campuses, the collegiate codebreakers were entering a setting that was both similar and different. Codebreakers left behind life at home and traveled to government facilities in Virginia and Washington, D.C. Upon their arrival at buildings like the United States Army operated Arlington Hall and the Navy occupied the Navy Communications Annex, the women found similarities with their previous locations. This chapter will primarily focus on Arlington Hall. Both branches-based sections of their crypt sectors in private women's schools. The defunct or conscripted campuses held the features that were needed by the Army and the Navy. The sprawling compounds hosted many buildings that accommodated the work and the workers. These government facilities became home to multiple types of people and workers. African Americans held positions in the Army, working at different levels. Arlington Hall, unlike the Navy, housed an all-African American codebreaking unit. At these facilities, civilian women brushed up against military practice and personnel. The differing background and ideologies caused some frustrations, but most individuals meshed well together. Within these new territories, young female cryptanalysts experienced certain degrees of freedom and independence. They were free to roam and soak up Washington, D.C. during a tumultuous and active period.

Female codebreakers disembarked from their homes and the security of their college campuses to answer the call of war in government facilities. Young women, leaving behind their familiar comforts, boarded trains and buses to make their way to

buildings like Arlington Hall, the Navy Communications Annex, and the Norfolk Navy Yard. At these locations, women made the transition from college students and teachers to secretive intelligence sector assets. The night before traveling to Arlington Hall, Helen O'Rourke spent the evening with the Board of School Teachers, handing out meat stickers and sugar rationing books.[124] O'Rourke was functioning in her traditional role and would soon be stepping outside of that position by serving as a cryptanalyst on Japanese communication systems. Travel to these private facilities was an adventure within itself. Winthrop College graduate Sara Stringfellow remembered arriving in D.C. at Union Station and being mesmerized by the sights and sounds. Stringfellow stated that, "I was a plain little ole girl from Chester, SC in Washington, D.C., and it was almost overwhelming."[125] Arriving in D.C. was an eye-opening experience for many cryptanalysts and served as their first brush with interesting encounters, events, and knowledge.

Arlington Hall, the Navy Communications Annex, and the Norfolk Navy Yard served as important buildings during World War II. Arlington Hall and the Navy Communications Annex both held connections to academia. In 1942, under the War Powers Act, the Army took control over a failing women's private school in Arlington, Virginia.[126] Just a twenty-minute car ride from Washington, D.C., Arlington Hall Junior College for Women, and its sprawling acreage, was transformed into a secretive military

[124] O'Rourke, National Security Agency.
[125] Stringfellow, interview with author.
[126] John P. Finnegan, "U.S. Army Signals Intelligence in World War II: An Overview," in *U.S. Army Military Intelligence History: A Sourcebook*, ed. James P. Finley (Fort Huachuca, Arizona: U.S. Army Intelligence Center & Fort Huachuca, 1995), 171.

center. The once women's college turned into the headquarters for the Army's Signal Intelligence Service (SIS), later renamed the Signal Security Service. In the following year, cryptologic operations at Arlington grew exponentially.[127] In early 1943, the agency employed 935 laborers, and by the end of the year, 3,455 workers became involved with the SIS. Two large temporary buildings cropped up on the vast stretch acreage in response to the influx of employees. Arlington Farms, a temporary housing compound for women civilians and service members, was built during this period. The high number of female codebreakers toiling away within the walls of Arlington Hall evoked the need for more accommodations. Elsewhere, in Washington, D.C., the Navy was engaging in similar facility management.

Female codebreakers operated in naval buildings in Washington, D.C., and Virginia. The Navy, akin to the Army, acquired a girl's private school for their operations. Mount Vernon College for Women, located on Nebraska Avenue in D.C., was acquired by the Navy for a lowball amount and became the Navy Communications Annex.[128] The thirty-nine-acre campus served as the settlement for the growing clandestine Office of Naval Communications, G Section (OP-20-G). Civilian workers and WAVES filled the halls of the appropriated school, working diligently on private communications and cracking enemy codes. In a further connection to academia, the OP-20-G was referred to the "Office of College Professors" due to the large number of officers who were Ph.D.'s and teachers.[129] Mary White Gettys found herself at the

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[127] Finnegan, "U.S. Army Signals Intelligence in World War II," 172.
[128] Stephen Budiansky, *Battle of Wits: The Complete Story of Codebreaking in World War II* (New York: Touchstone, 2000), 223-25.
[129] Wilcox, *Sharing the Burden*, 7.

Norfolk Navy Yard, located in Portsmouth, Virginia. This location served as an area for the maintenance and repair of Navy ships during World War II. While working at Norfolk, Gettys came in contact with many types of ships and foreign personnel.[130] Secluded from the rest of the daily operation occurring in the naval yard, the hustle and bustle still reached the codebreakers. Gettys remembered a lot of people coming and going on Allied ships. These different sites functioned as facilities for codebreaking operations for many collegiate cryptanalysts.

While in Washington, D.C., and Arlington, Virginia, female codebreakers experienced surroundings similar to their college campuses. The girls became acclimated to new cities, unique places of interest, and distinctive individuals, but often their home base shared similarities to their prior training facilities. Arlington Hall and the Navy Communications Annex were stationed in women's academic centers. Once again, college campuses offered the armed services the amenities and accommodations needed. Both compounds were secured areas with a large amount of flat land. Buildings already occupied the acreage, and the campuses had the capacity to house huge numbers of individuals. Codebreakers who stayed on the large campuses were lodged in dormitories and took advantage of food services on-site in the form of cafeterias. The scenery changed, but the setting stayed nearly the same. However, the women were no longer just college graduates. They were patriotic codebreakers, ready, and willing to step into the war effort.

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[130] Mary White Gettys, Louise Pettus Archives and Special Collections.

The facilities mentioned above were not only the headquarters for the Army and Navy intelligence communities, but they also became the codebreakers' workplace and sometimes living quarters. Winthrop College graduate Stringfellow found herself in Arlington, Virginia, in 1944.[131] The codebreaker's mother, who traveled to the nation's capital with her, secured housing for her with a family member. However, her mother returned to Chester, South Carolina, when Stringfellow's brother was sent home after being injured in the war, and she was alone in a new city. After, the codebreaker sought out housing at Arlington, something that she claimed was "wonderful." She compared it to living in dormitories at school but with more freedom. At Arlington, the girls had no college campus matron, watching over them, tracking their whereabouts, or canvassing their living quarters for interlopers. However, the barracks did have a WAC stationed at the front desks, checking if the girls were following curfew regulations, something that was in line with typical military practice.[132]

The Army Arlington Farm complex and WAVES Quarters D featured many amenities. Tucked away down long corridors, girls shared a common bathroom and laundry room. When space was sparse in the laundry, workers would take their garments to hang in their room. For entertainment on the twenty-eight acres the ten dormitories sat upon, dances were hosted about once a month on Saturday evenings.[133] Down in the large main lobbies, young women and servicemen from the neighboring Army post, Fort Myer,

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[131] Stringfellow, interview by author.

[132] Margueritte Wampler, interview by Jimmie A. Collins, January 25, 2002, transcript, National Security Agency, https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/oral-history-interviews/nsa-oh-2002-03-wampler.pdf.

[133] Wampler, National Security Agency.

gathered in the booths that littered the foyer. A good band began playing, and girls could

dance the night away with their dates. WAVES Quarters D was located across the road

from the Navy Communications Annex, allowing women to walk to work, and those

wanting to visit downtown D.C. could hop on the bus or hail a taxi for a quick ride into

the city. When not working, WAVES women relaxed in the Recreation Building.[134] This

building housed a sundeck, a swimming pool, sewing room, library, telephone center, a

blowing alley, a beauty shop, and a dark room. Girls could take classes in ballroom

dancing, drama, exercises, bridge, and crafts.

Both Army and Navy complexes contained mailrooms, service shops, cafeterias,

and sporting facilities. Mailrooms allowed women to stay in touch with family, friends,

and lovers. Sending a letter was a more accessible way of communication when

compared to putting in a request for time off or leave from the round the clock war effort.

Service shops operated as small stores within dormitory halls. These shops offered

women the chance to purchase simple pantry items, cosmetics, and other drugstore

products. Each facility provided meals to the codebreakers and the other workers that

inhabited the complexes.

Army codebreaker Margueritte Wampler stated that the food offered at Arlington

was "very good" and considered it "delicious."[135] Codebreakers had a variety of food

served to them, including fish, chicken, beef, and macaroni, and cheese. One cryptanalyst

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[134] U.S. Navy, *WAVE Quarters "D": Station Rules For Life At "D"*
https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/w/wave-quarters-d-station-rules-for-life-at-d.html.
[135] Wampler, National Security Agency.

working with the Army remembered the mess hall serving them meals until late evening.[136] She detailed the schedule the cafeteria ran on, a meal at lunch, and a meal at supper. However, when midnight cravings rolled around, girls had to be creative. She claimed that hearing the rattling of coins late at night was not uncommon, as girls searched for vending machines for a quick snack. Due to the strenuous shift's codebreakers worked, many active at nontraditional hours, and some would skip meals or just grab a coke or coffee from the service shop. Aside from classes and dances as entertainment, the Army and the Navy provided sports materials for the codebreakers. Arlington's campus had tennis courts, and at the WAVES headquarters, women could participate in organized seasonal sports like swimming, archery, basketball, and badminton.

However, living at Arlington Farms and naval housing facilities did have some drawbacks. Codebreakers dealt with a lack of hot water, paper-thin walls, and sweltering humidity. At Arlington, one cryptanalyst recalled hearing announcements over the loudspeakers advising workers to wash their faces at the offices before going back to the dormitories, due to the lack of hot water.[137] The living quarters were not soundproof, and girls could often hear their neighbors' next door. SIS member Helen O'Rourke stated that many complained that their neighbors could communicate with each other without having to leave their respective rooms. They could talk right through their shared walls.[138] During the sizzling and tacky summer months, the girls of Arlington felt the heat.

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[136] O'Rourke, National Security Agency.
[137] O'Rourke, National Security Agency.
[138] O'Rourke, National Security Agency.

Conditions were described as "very hot and sticky," and one codebreaker claimed that some people even passed out from the extreme heat in the attic of Arlington.[139]

Navy codebreakers mentioned about similar issues at their dormitories. Myrtle Hanke stated that in the barracks, no one was separated by shifts.[140] She would return from her shift, exhausted, back to her room for some rest for the next day. However, Hanke would often hear the surrounding inhabitants getting ready and leaving, allowing their doors to slam, for their early morning 4:00 shift. Located in Washington, D.C., the girls of WAVES Quarters D were also familiar with warm weather. The extremely humid air of D.C. and the lack of air conditioning in the living quarters made girls miserable. While living in Arlington and Washington, D.C., codebreakers ran into issues with their living quarters.

While the world was at war, the institution of racism persisted and was preserved by organizations like the Army and Navy. African Americans in the armed forces were segregated from white units. Black male troops were fighting on behalf of a nation that prided itself on freedom and democracy. However, that nation actively hindered their autonomy and equality at home and war. Black women faced a double-edged sword of discrimination while in the armed services and on the home front. Being both female and black, African American females experienced the prejudice of misogyny and the intolerance of racism. They were not only adjusting to being female in newly created military sectors but were also considered and treated as substandard in this new-found

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[139] Caracristi, National Security Agency.
[140] Hanke, Women Veterans Historical Project.

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organization and the intelligence divisions.[141] African Americans were often overlooked

for the duration of the war effort during World War II. Employers found justification in

excluding or separating blacks from white workers and wartime employment due to the

fear of backlash from whites.[142] Employers were worried that introducing African

American workers into jobs would cause white workers to strike, thus losing revenue and

harming the war effort. However, blacks were involved in the war effort and active

within crypt sectors.

    The Army was quicker to open its ranks to African American women when

compared to their Navy counterparts.[143] After some prodding, the Army allowed black

nurses to serve, but only with segregated black units. The Navy only accepted black

women into the WAVES in October of 1944, the Coast Guard Women's Reserve

(SPARS) allowed black women to join in March of 1945, and the Women Airforce

Service Pilots (WASP) never admitted women of color, no matter their experience in

flight. African Americans were employed by the Army at Arlington Hall and did have a

presence on the campus. Some blacks worked as messengers, delivering information

across the sprawling Arlington campus and to other military facilities. Most were

involved with jobs that dealt with motor equipment, cooking, administrative work, or

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[141] Yellin, *Our Mothers' War*, 210.
[142] Karen Tucker Anderson, "Last Hired, First Fired: Black Women Workers during World War II," *The Journal of American History* Vol. 69, No. 1 (June 1982): 85, https://www.jstor.org/stable/1887753.
[143] Yellin, *Our Mothers' War*, 216.

custodial work.[144] Even those with college training and post-secondary educations were, at times, regulated to menial tasks instead of skilled and professional labor.

However, at Arlington Hall, an African American cryptanalytic branch existed during the war. In early 1944 William Coffee and Annie Briggs began working in decoding nongovernmental commercial cipher messages from all over the globe.[145] They sorted through messages, looking for anything that was not a part of standard trade patterns. Initially brought in as Coffee's assistant, Briggs led one of the largest sections in B-3-b and another woman, Ethel Just, managed translators in the language unit. By June 1945, Coffee was the *de facto* leader of the unit and guided thirty black codebreakers. In an already secretive environment, this cryptanalytic branch was Arlington's best-kept secret.

Many white female codebreakers were not aware of the existence of this all-black codebreaking crew or the African American presence in Arlington at all.[146] While stationed on the campus, O'Rourke stated that she saw no black people on the premises in the beginning but began seeing black workers in 1944.[147] Some found issues with their presence. The codebreaker claims that the majority of people happily worked alongside the black cryptanalysts, stating that they were very good, but some people felt that it wasn't "proper." Within Virginia, African American codebreakers faced a segregated

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[144] Janet Sims-Wood, "Service Life in the Women's Army Corps and Afro-American WACs," in *A Woman's' War Too: U.S. Women in the Military in World War II*, ed. Paula Nassen Poulos ((Washington, D.C.: National Achieves and Records Administration, 1996), 135.
[145] Jeannette Williams, *The Invisible Cryptologists: African-Americans, WWII to 1956* (Fort George G. Meade, MD: Center for Cryptologic History, National Security Agency, 2001), 11.
[146] Williams, *The Invisible Cryptologists*, 14.
[147] O'Rourke, National Security Agency.

society. Unlike the white workers at Arlington who could freely move throughout Virginia and Washington, D.C., African American codebreakers were bound by discrimination. Black laborers couldn't ride in the front of the bus, they couldn't go to some restaurants, and they couldn't attend festivities at local parks. While working diligently for the national war effort, African Americans faced inequality and bigotry in all sectors.

At Arlington Hall, civilian working women brushed up against military practices and personnel, both male and female. The Army's cryptanalysis sector was a less rigid and more flexible arrangement.[148] Ann Caracristi recalled the structure of the SIS at the time, stating that it was "extremely informal," and there was "very little bureaucracy involved."[149] Workers within units worked together to decode and encode messages, and supervisors were eager to see their results, complementing and helping along the way. Arlington Hall employed civilians, women, African Americans, and Jewish workers. Jeuel Bannister Esmacher remembered a young man who had cerebral palsy so bad that he could hardly walk. Still, he spoke five languages and was a valuable asset to the war effort.[150] During Wampler's experience on the complex, she recalled that civilians and the military workers got along.[151] Both were working towards the same outcome and effort. Quarrels would only slowdown that process.

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[148] Mundy, *Code Girls*, 207.
[149] Caracristi, National Security Agency.
[150] Esmacher, Louise Pettus Archives, and Special Collections.
[151] Wampler, National Security Agency.

However, clashes of background and personality occurred. Many of the civilians were young women with no military background, attempting to enter an Army run sphere of influence. O'Rourke claimed that there was some "small irritation" at times between civilian workers and Army personnel.[152] Some female civilian codebreakers had never been ordered around by military figures and were unfamiliar with Army protocol. O'Rourke stated that some felt that everyone was equal and there was no reason to give any special attention because of rank. At the same time, the Army personnel wanted the crypt program to fall in line with military procedures.

When codebreakers were able to break away from their secretive facilities, they became immersed in the magical setting of Washington, D.C., during World War II. The stress of rotating shifts, functioning in a new military environment, sifting through rolls and rolls of codes, and the pressure of keeping work quiet for the sake of the nation was temporarily relieved by the short time these young women had off of duty. With their new-found freedom, higher wages, and what little free time they could steal away, women were able to attend concerts, go to the theater, visit historical landmarks, and even come in contact with famous figures. While working at Arlington Hall, Stringfellow met General Dwight D. Eisenhower.[153] The Winthrop graduate stated that the General walked by her worktable, stopped, and asked her how she liked the work she was doing. She immediately responded with, "I love it, I love what I'm doing!" Eisenhower then reached to shake her hand and thanked her for her service.

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[152] O'Rourke, National Security Agency.
[153] Stringfellow, interview by author.

Codebreakers visited national monuments, museums, and toured the city during

their recreational time. Stringfellow and friends took advantage of their surroundings and

the high energy of the city during this period.[154] They toured as many national

monuments as they could. The codebreakers visited museums, went to picnics in Rock

Creek Park, went to the theater, and attended parades for Generals that would arrive in

D.C. Stringfellow climbed the Washington Monument and was in the capital when

President Franklin Delano Roosevelt died in April 1945.[155] On Roosevelt's death, the

Winthrop College cryptanalyst stated that, "it was sad, because everybody loved him, and

we felt that he brought us through a terrible war." After hearing the news, the

codebreakers gathered in Lafayette Square. Across from the White House, they observed

a recently widowed Eleanor welcoming guests. Wampler recalled the exciting time she

and her coworkers had in D.C.[156] Wampler and her roommate would rollerblade through

the city and catch the bus to visit anywhere they wanted, untethered and unbothered. In

new cities and surroundings, codebreakers broke away with what little free time they had

to explore and experience the nation during World War II.

Others found relaxation in entertainment at clubs and physical activities on the

Arlington compound. Jaenn Bailey and her fellow WAVES went to concerts and

performances in the nation's capital.[157] They saw Frank Sinatra at the 400 Club in D.C.,

one of the many local events that handed out free tickets for women in service. At the

same club, they saw Tommy Dorsey and bought a pitcher of beer for fifty cents, spending

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[154] Stringfellow, Louise Pettus Archives and Special Collections.
[155] Stringfellow, interview by author.
[156] Wampler, National Security Agency.
[157] Bailey, Women Veterans Historical Project.

the night laughing and spilling spirits all over on a male officer next to them. Esmacher found solace in sports.[158] She was a codebreaker in the evening and a tennis player during the day. Female codebreakers from Arlington Hall and D.C. were situated near and in the nation's capital throughout a tumultuous and busy period. They utilized their small free time to break away from the high-pressure situations of their cryptanalysis sectors to destress.

After leaving home and work behind, young women left their comfort zones and embarked on their trips to the secretive Army and Navy facilities. Arlington Hall and the Navy Communications Annex were located in women's schools, continuing the constant theme of academia throughout the codebreakers World War II experience. While being stationed on these campuses, women came in contact with different people and encountered, both on and off military complexes. At military facilities, most young women experienced a higher degree of freedom and agency than previously exposed to on their college campuses and at home. However, some groups of marginalized peoples, like the African Americans did not. Black codebreakers were marginalized at Arlington and in the surrounding area. Nevertheless, a unit of nearly all-female African Americans operated on the Army's premises. White female codebreakers, who had the privilege, traveled throughout Arlington and the nation's capital. Once acclimated to their settings and facilities, the codebreakers got down to work.

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[158] Esmacher, Louise Pettus Archives and Special Collections.

Chapter 6: Women Cryptologist's Roles in Winning the War

Getting down to business, collegiate codebreakers filled many roles in victories pertaining to World War II. Their presence within securely protected military facilities highlighted their importance to the war effort. Codebreakers participated in a multitude of assignments and jobs within the Army and Navy intelligence sectors. Young women began deciphering codes, testing the United States' ciphers for possible weaknesses, and organizing the materials secured from cracking enemy codes. To accomplish these duties, young women worked around the clock. Shifts matched the reality of this operation, never-ending, cycling continuously as the war raged on in faraway lands. While working these endless shifts, female cryptanalysts contributed towards ending the war. They successfully partook in breaking codes that lead to battle plan changes or Allied triumphs in deadly clashes.

Some codebreakers stated that they were doing the "grunt work,"[159] not fully realizing the larger picture and how each piece fits together. However, others claimed to know about rough details from the information they gathered and were able to recognize some data. Due to their proximity to this information, codebreakers needed to understand the great secrecy. The buildings they were stationed in took great lengths to ensure the safety of delicate material. Covert female codebreakers toiled away alongside men stationed at their facilities, allowing for their male counterparts to ship off to the conflict.

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[159] Corrin, National Security Agency.

While some commented on the unbothered nature of the males there, some codebreakers experienced issues with disgruntled men.

Tucked away in top-secret rooms at highly guarded facilities, young women were cracking Axis ciphers, testing the strength of the United States' codes, and organizing and delivering sensitive materials. Female codebreakers worked on multiple levels of difficulty and a multitude of systems. Sara Stringfellow recalled the environment in which she and other codebreakers operated in.[160] Stringfellow did not use machinery during her process. They sat at a long table with a total of ten people, five on each side, girls, began filtering through information. Down at the end of the table, a large roll of paper was drawn down the surface, and each person would have a graph. They would punch through the graph onto the paper, creating a pattern. This would continue down the length of the table, and then the final product would be taken upstairs, where officials used the data gathered by the female workers. Helen O'Rourke, who worked with the SIS at Arlington Hall, was a cryptanalyst on Japanese crypt systems.[161] She was involved with decrypting water transportation messages that detailed information about Japanese convoys out at sea.

One codebreaker commented on the trial and error nature of codebreaking and how machinery bolstered their cause.[162] Before machine aids, the operation relied heavily on memory and close analysis. Once machinery entered the picture, codebreakers could speed up the trial and error process. Equipment and technology were created as the

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[160] Stringfellow, interview by author.
[161] O'Rourke, National Security Agency.
[162] O'Rourke, National Security Agency.

codebreaking process occurred, occasionally by the codebreakers themselves. As new

problems cropped up, solutions had to be tailor-made to combat the present issue.

Cryptanalysts Juanita Moody, along with linguist and mathematician Alex Pringle, was

involved in making a machine in an attempt to reconstruct additives of the code to get an

idea of the sequences used, thus creating a key.[163] Moody came in as a clerk, working

with the German problem, and was eventually the supervisor of the hit desk. She recalled

interacting with IBM equipment to split additives, sort them, and organize them. At the

Naval Communication Annex, women operated bombe codebreaking machines.[164] The

massive bulky behemoths worked on decoding German messages encoded by the Enigma

machine. Female codebreakers created and utilized machinery to decode, list, and

organize sensitive materials.

With the information the codebreakers gathered, intelligence sectors created, and

also came in contact with captured Japanese and German codebooks. Codebooks became

essential tools for Navy codebreaking operations. In 1944, Elizabeth Caccavale stated

that the capture of a codebook was the most significant event of her entire navy career.[165]

She recalled working the late shift, and she began packing up around eleven o'clock at

night, preparing to head back to her room. However, a nondescript man, carrying a

briefcase entered their sector. Within this plain briefcase was a Japanese codebook.

Caccavale's higher-ups told the girls that they didn't have to stay but stated that they

would need all the help they could get dissecting the important resource. The officials

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[163] Moody, National Security Agency.
[164] Wilcox, *Sharing the Burden*, 10.
[165] Caccavale, Women Veterans Historical Project.

conveyed the significance and communicated the dire consequences of the outcome of these materials. If the girls stayed, they would be there until the conclusion of the project, however long that would take. Showing her devotion, Caccavale stayed on and worked with the codebook. Two days later she would return to her room, exhausted but accomplished, Caccavale rested.

Young women also tested codes created by the United States to guarantee strength, and they also decoded Allied messages sent to intelligence and repair centers. Mary White Gettys, a WAVE cryptanalysts, remembered the process of encoding and decoding messages at the Norfolk Navy Yard in Virginia.[166] Most messages received in the navy yard were on the topic of repairs. Allied ships that were damaged sent coded communications to Norfolk to relay the damages and ensure that enemy ships lurking in the oceans did not know their wounded status. Some codebreakers worked to consolidate information and transfer important documents to those in senior positions in the war. Gettys claimed that if a top secret message came through, one of the girls would strap on a .38 pistol and deliver it to the proper official.[167] Another WAVE, Helen Allegrone recalled running the United States' messages through a large machine, try and find weaknesses.[168] Codebreakers worked on cracking their own nation's codes and machines to safeguard American crypt sectors.

During World War II codebreakers worked around the clock, breaking enemy codes and testing ciphers created by the United States to ensure crypto superiority. The

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[166] Mary White Gettys, Louise Pettus Archives.
[167] Mary White Gettys, Louise Pettus Archives.
[168] Allegrone, Women Veterans Historical Project.

cryptology sectors for both the Army and Navy were demanding fulltime operations. One WAVE codebreaker remembered shifts running at all times, with a large number of people keeping the sector going without stops.[169] Cryptanalysts worked on multiple shifts that rotated out every three days or so. Girls would often work every shift at one point, swinging to the next after the subsequent change. Workers at these codebreaking facilities functioned on multiple shifts. At Arlington Hall, codebreakers worked on a three-shift schedule.[170] Women were active during the morning to afternoon day shift, during the mid-afternoon to midnight swing shift, and during the late-night to early morning graveyard positions. Female codebreakers worked around the clock in an attempt to shorten the conflict raging overseas.

The war didn't stop, and neither did the young female cryptanalysts. For some, time off was a concept that was few and far between. Allegrone remembered one day off a week to have fun, relax, and recuperate for her next shift.[171] However, even sickness did not warrant time off or privacy from the never-ending stream of ciphers. Allegrone fell very ill one day and was unable to report to work. Her boss arrived at her home and requested that she help break down a coded message for the president. Staying up all night, thinking of the soldiers fighting, she cracked the code. Although it turned out to be a message from an unstable woman writing to Roosevelt in ciphers, the cryptanalysts buckled down in her illness and completed the task at hand. Downtime meant a possible lapse of information or falling behind on old enemy code patterns. As enemy codes

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[169] Corrin, National Security Agency.
[170] O'Rourke, National Security Agency.
[171] Allegrone, Women Veterans Historical Project.

flowed in and out, so did the girls. They worked diligently into the night and morning in

hot rooms, full of people, jumping from one shift to the next, all in the name of the war

effort. Female codebreakers' dedication and constant presence within the halls of Army

and Navy intelligence sectors solidified their importance in these operations. Their hard

work and commitment would prove momentous in many instances.

Young female cryptanalysts shattered ciphers and helped break codes that

impacted battle outcomes and plans for military excursions. Their importance and

presence shined bright when wading through codes, cracking, and smashing secret enemy

language systems. Georgia Ludington was a part of the section that was involved with the

Battle of the Coral Sea.[172] This four-day encounter saw a joint Allied victory over the

Japanese in the Coral Sea, blocking the capture of Port Moresby in New Guinea.

Ludington claimed that while working as a stenographer, her division dealt with

information about happenings in the South Pacific. At the time, Washington began

publishing summaries of traffic analysis reports twice a day.[173] The Washington

codebreaking unit was able to break ciphers quicker than smaller closer field units.

However, their location caused the information to arrive later.[174] They developed a

healthy amount of competition with other field units, bolstering the need to break this

code. Though they did not directly solve the Japanese code, Ludington's section was later

bestowed an award for their help.

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[172] Ludington, National Security Agency.
[173] Frederick D. Parker, *A Priceless Advantage U.S. Navy Communications Intelligence and the Battles of Coral Sea, Midway, and the Aleutians* (Fort George G. Meade, MD: Center for Cryptologic History, National Security Agency, 1993), 16.
[174] Mundy, *Code Girls*, 143.

Other codebreakers were directly involved with cracking codes and changing the landscape of the war. Winthrop graduate Jeuel Bannister Esmacher recalled one particular code that she would never forget.[175] The cipher came through quite muddled and twisted. She started decoding and was able to discern that a certain vessel was leaving a specific port at a particular time. She deciphered the arrival location, and what the ship was hauling. Esmacher claimed that she "knew she had hit on something very important" after clarifying the message. She took the missive up to the "big boys" on the third floor. In the following weeks, Esmacher heard over the radio that the ship was now in a watery grave. Upon hearing this information, the Winthrop codebreaker stated that she "felt she had a little hand in that." O' Rourke remembered decoding Japanese materials that could have changed the entire landscape of World War II.[176] In 1944 the codebreaker and others in her unit got ahold of sensitive matter from a Tokyo circuit. They began sifting through and pumping out the most important data. O'Rourke stated that later, two officers approached her and relayed to her that the previously planned invasion of Japan was scrapped because of the information they gathered from these materials.

Some codebreakers had no clue what materials they were working on. However, others, like those mentioned above, were able to gather information from the data they were decoding. Due to security and safety, information was guarded, and some workers did not have access to complete ciphers. When dealing with the ULTRA classification, a

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[175] Esmacher, Louise Pettus Archives.
[176] O'Rourke, National Security Agency.

conglomerate of Allied intelligence dealing with Axis encryptions, codebreaker Caracristi stated that, "being a cryptanalyst, I was dealing more with the raw material and the technical data and I really wasn't reading product, particularly."[177] Nevertheless, some codebreakers were able to piece together information and make connections to the outside world. Jaenn Bailey recalled decoding messages sent to President Roosevelt.[178] She claimed that the codebreakers working in the dispatches were aware of the content within the messages.

Perhaps one of the most critical factors in codebreaking was the secrecy surrounding it and safekeeping of that confidentiality by the codebreakers. Young women working in the crypt sectors of the Army and Navy witnessed the great measures taken to ensure the safety of the codes and their results. Crypt sectors indoctrinated security measures in a variety of ways. Informal security lectures served as verbal reminders, and rules were on display in pamphlets and literature. Codebreakers could not utter a single word about the work they did, even to other workers in their government facilities. One codebreaker stated that, "you didn't say one word about what you did."[179] Girls would become friendly with other workers or enlisted folks, and neither would know the work the other did. O'Rourke and the women in her sector became familiar with a sergeant in the mess hall. She claimed that she never knew what he did or what section he worked in. Corrin was so secretive and discreet about what she did while in the Navy, she lied about what she did to her future husband.[180] Unable to tell him the true nature of her work and

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[177] Caracristi, National Security Agency.
[178] Bailey, Women Veterans Historical Project.
[179] O'Rourke, National Security Agency.
[180] Corrin, National Security Agency.

worried about punishments for speaking out, she simply told him she was involved in communications and nothing more.

Codebreakers remembered vividly, the practices put forth to secure the clandestine zones and trustworthy workers. Codebreakers working at Arlington used identification badges.[181] Round button badges, with the worker's image, adorned the blouses of the working women. The badges were to be worn at all times and never left behind on a coat or at their workstation, lest some nefarious individual could steal it. When breaking for lunch or a quick run to the snack machine, materials needed to be covered and organized in secured piles. O'Rourke stated that during one forgetful covering incident, WACs grabbed uncovered sensitive materials from workers' desks while they were away from their position. This episode served to show that codebreakers needed to be extremely careful and secure at all times, even inside the protected buildings. Bailey recalled an example of distrust within the walls of the Naval Communication Annex.[182] An Englishman would often come into their sector, claiming that he needed a file. The girls deemed that he was trying to covertly gather intelligence, and they began reacting accordingly when he would enter their unit. Bailey stated that the minute he came in, they would guard their materials and give him no information.

The extreme lengths for security and silence weighted heavily on the women participating. The responsibility of confidentiality was primary. It was drilled into the codebreaker's heads since day one. Some even experienced it on their college campuses

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[181] O'Rourke, National Security Agency.
[182] Bailey, Women Veterans Historical Project.

while taking crypt courses. A common aspect of propaganda posters was the theme of careless chatter. If confidential messages were blabbed about, it could mean the end of Allied soldiers and materials. Caccavale remembered the hardest thing about being a codebreaker, and it involved the stressful secrecy.[183] She hated the lying aspect of her job, telling someone something that was not true burdened her greatly. A facet of fear and danger was always present due to the nature of the women's work. Caccavale even recalled hearing a warning about the enemy that included the possibility of a kidnapping occurring.

If one were to speak about what they were doing or did at Arlington Hall or the Navy Communications Annex, punishment was absolute. Stringfellow stated that after she departed from the super secured facilities, the girls had to take an oath.[184] The oath barred the codebreakers from speaking about their work for some time. The Winthrop cryptanalyst confirmed that they could never discuss their jobs. Esmacher claimed that the military even deployed protective measures outside of their facilities.[185] After shifts ended, buses would line up out front to take the girls back to their living spaces. She stated that as the codebreakers crowded onto the buses, so did Arlington Hall plants. The "spies" listened to the chatter around them, searching for anyone that was speaking about confidential workday activities. The codebreaker stated that, "when they are going to those extremes, you simply don't discuss it."

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[183] Caccavale, Women Veterans Historical Project.
[184] Stringfellow, interview by author.
[185] Esmacher, interview by author.

Female codebreakers entered an often-male dominated sphere at these military facilities. The primary use of these women was to take the place of a man who could leave stateside and head overseas to fight. Most female codebreakers claim they experienced no issues with the men at their buildings or sectors. Stringfellow stated that they were treated "wonderfully."[186] The Winthrop College codebreaker did not remember any disrespect towards the girls from any man, no matter his position. The war effort was very much on the minds of the nation and those working in crypt sectors.

Turning against one another would only slow the system down and hinder the primary goal, end the conflict as soon as possible. Caracristi commented on the fact that women could get a job within this sector.[187] The codebreaker argued that there were a lot of important ranked women in cryptanalysis units that held jobs with responsibilities. She stated that any other issues could be chalked up to personality difficulties and not a male-female problem. Bailey claimed that her Commander, who was a male, treated them well and helped whenever needed.[188] She recalled one instance when her male supervisor stood up for her. Bailey had been caught whistling while walking into work on a beautiful day. A male enlisted personnel reprimanded her for whistling and wrote her up for her perceived transgression. Bailey reported the incident to her Commander, and he went to the commanding officer to have the offending male scolded. The generally excepted and community practice of helping in the war effort assisted women in crossing gender normative lines.

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[186] Stringfellow, interview by author.
[187] Caracristi, National Security Agency.
[188] Bailey, Women Veterans Historical Project.

However, not all men were happy and eager to welcome young women into the fold. Female codebreakers, civilians, and those in the armed services were seen as foreign objects invading a longstanding traditional domain at an accelerated rate. Their arrival meant that men would be sent out to the horrors of war. When Allegrone joined the WAVES, she was featured in her small town's newspaper.[189] She soon received a letter from someone she wasn't familiar with, an enlisted man. In the message, he chastised her and demanded to know, "what do you women think you know about all this?" Another female codebreaker recalled the reactions of male officers when ladies began to arrive for work.[190] The Lieutenant Commander of their section previously taught at an all-boys' school. Once the women started coming in, he was "aghast" and had no idea on "how to handle them." Whether it was animosity for taking a man's place stateside, to send them to the horrors of war, or their womanly existence within the walls of military facilities insulted dogmatic individuals, codebreakers did notice some resentment towards their presence during the war.

Female cryptanalysts functioned in many important roles during World War II. They actively decoded Axis messages, tested the United States' ciphers for weaknesses, and worked to organize and deliver sensitive materials. Due to duty and the heavy workload of Army and Navy crypt units, women worked around the clock. These endless shifts allowed the women to come in contact with captured codebooks and work diligently to smash important ciphers. Codebreakers were involved in changing battle

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[189] Allegrone, Women Veterans Historical Project.
[190] Hanke, Women Veterans Historical Project.

plans, assisting other units in breaking difficult messages, and helping sink dangerous enemy vessels. While some knew the big picture, others were working with smaller details. The guarding of buildings, workers, and data was a constant in the codebreaker's lives. Secrecy was an important feature of their military facilities. Young women were required to safeguard their work and details at all times, no matter the outcome. At Arlington Hall, the Naval Communications Annex, and the Norfolk Shipyard, men and women created an interesting dynamic. Most female codebreakers experienced positive and respectful situations with their male coworkers and superiors. However, some were dissatisfied with the feminine presence. As female codebreakers worked to crack codes and assess friendly ciphers, the beginning of the end was just upon the horizon.

Chapter 7: The Beginning of the End

During the warm summer of 1945, World War II came to an end. Nazi Germany
surrendered in May and Japan followed suit in August, by September the war was
officially over. Female codebreakers were present in Washington, D.C., during both
surrenders, experiencing the joy and jubilation fully. Once word arrived that Germany
had yielded, cryptanalyst continued working on cracking Japanese codes. Upon hearing
confirmation of Japan's surrender shortly after, life began shifting for the Army and Navy
codebreakers. Some women stayed with their intelligence units, working with the
blossoming Soviet problem. Their skills shaped and impacted the transforming
communication sectors. Others left behind their codebreaking way after the need for
workers dropped drastically with the end of the war. They returned home, leaving behind
the secrecy and stress of codebreaking, to normal civilian life, to go back to work, marry,
and raise families. Their experiences made lasting impressions on the young women who
bravely left behind the norm to combat enemy entities. The opportunity to smash ciphers
and join the armed services allowed women freedoms and prospects they otherwise
would not have had.

Nazi Germany surrendered on May 7, 1945, nearly a week after Adolf Hitler's
suicide. "Victory in Europe Day" or V-E Day was declared the next day, May 8. Erma
Kirkpatrick recalled the jubilation she witnessed after Germany's surrender occurred.[191]
Kirkpatrick and others were plugging down the road in Washington, D.C., halting to get
out and celebrate whenever there was a traffic stoppage. They would get out and hug

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[191] Kirkpatrick, Women Veterans Historical Project.

people from other cars, and if they had uniforms on, they would "get the best hugs." This was the first inklings of an official end in sight. Codebreakers knew that some of those fighting the German offensive would be returning. However, World War II was not over just yet. Juanita Moody summed it up perfectly by stating, "The end of the German war didn't mean anything to us."[192] Moody and her workers were deeply involved in breaking Japanese codes. While happy that one great Axis power had yielded, she understood that work needed to continue because the war had not truly ended. The conflict with the Japanese still raged on, and codebreakers resumed deciphering and reporting.

On August 14, 1945, three months after Germany's surrender, President Harry Truman announced that Japan had yielded. Truman deemed September 2 the official "Victory over Japan Day" or V-J Day, but the initial surrender was celebrated by codebreakers outright. This event marked the end of World War II and the end of six years of bloody battles, destruction of cities, and the end of widespread codebreaking operations for the Army and Navy. Codebreakers were elated when the news broke that the Japanese had surrendered. Sara Stringfellow was working at Arlington Hall the night the news spread and claimed that it was the "most exciting time of her life."[193] The workers went crazy, and everyone was incredibly happy and excited. Stringfellow stated that some people were falling to their knees in prayer because Japan had surrendered. Stringfellow and the others, unable to immediately leave, had to stay and finish out their shift. They were allowed to go outside on to campus and hold impromptu festivities. The

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[192] Moody, National Security Agency.
[193] Stringfellow, Louise Pettus Archives.

Winthrop College graduate stated that the cryptanalysts danced, sang, and celebrated. Moody remembered hearing rumor circulating that Japan yielded.[194] She stated that this rumor affected them "psychologically." Moody was deeply entrenched in the Japanese sector, hearing that it could all be over with the ending of the war was significant. She left the building to head home after her shift, and a colleague approached her, informing her that, "it's come out, the war is over."

With that surrender, Washington, D.C. erupted and celebrated to the fullest extent. Jeuel Bannister Esmacher recalled finally being able to leave her post at Arlington Hall and venturing out into the nation's capital to take in the celebrations.[195] The codebreaker knew the fighting was over but could not leave her position. The codebreakers eagerly awaited Truman's announcement to the nation that the war was over. Esmacher stated that, "all of us, I mean all of us, went into Washington, D.C. It was one happy night." Festivities in D.C. kicked off, and it soon became crowded. The Winthrop College codebreaker remembered dense gatherings of people, shoulder to shoulder, singing, and enjoying the fantastic event. Another worker, Myrtle Hanke, stated that they were dismissed from their watch and immediately went into the city. Hanke detailed her night after the victory, claiming that there were conga lines all over and visits to the American Theater Canteen galore.

The end of the war signified the return of friends, lovers, and in all hopes, a turn toward normalcy. Operations at the Army and Navy codebreaking sectors began to slow

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[194] Moody, National Security Agency.
[195] Esmacher, interview by author.

to a crawl. The last bit of confetti fell, spontaneous kisses ended, and celebrations were

wrapping up. Many codebreakers returned to their facilities to see a drop in raw data.

Helen O'Rourke recalled the wrap-up process for her section before being reassigned to a

new problem.[196] Workers began cleaning and finishing up projects that were near

completion. O'Rourke stated that they started collecting a burn bag, worksheets and

original copies were destroyed, but final translations were saved. Cryptanalysts with little

to no codes left, wondered what would come next in their careers. Moody remembered

turning to her coworker, Alex Pringle, and asking, "and now what do we do?"[197] With a

drop in ciphers, tests, and organization, the need for young female workers dwindled.

Some left shortly after being released by their employer, while others stayed on, tasked

with a new assignment. Just as one heated war ended, another was slowly growing a

frosty cold.

Some female codebreakers stayed to continue working in the intelligence sector

on new and growing issues. During World War II, the Soviet Union was the United

States' once enemy and eventual ally. Nevertheless, the tentative alliance between the

two nations began to crumble shortly after the fighting cease, creating a frosty

relationship between the two. A new problem arose, one that needed skilled and devoted

codebreakers. Esmacher stated that they played it day by day until the higher-ups gave

the girls their options.[198] She was given the option to stay, and the Winthrop College

graduate was placed in Russian language classes after the war. Esmacher worked on "The

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[196] O'Rourke, National Security Agency.
[197] Moody, National Security Agency.
[198] Esmacher, interview by author.

Russian problem" until 1950. Uninterested in making a move to Fort Meade in Maryland and her family's growing size, she retired from codebreaking. O'Rourke found herself reassigned to the Soviet sector.[199] As fellow workers departed to farewell parties and others began closing down Japanese operations, O'Rourke was pulled elsewhere. Her new sector had been functioning secretly for some time, even before the war ended. She claimed that around thirty people were moved in the Russian sector by 1946.

Codebreakers left or thought about leaving. Some would later return to cryptanalysis or were persuaded to stay by officials. Ann Caracristi remembered people shifting around and leaving during this period.[200] The codebreaker moved from the Japanese sector to the Chinese problem after the fighting ceased. She recalled the pressure on those nonessential workers to leave and get themselves off the payroll. Caracristi departed the SIS but returned a year later to work in the Russian sector. After World War II was over, Moody attempted to leave Arlington and continue on the planned route she had plotted before the conflict.[201] She contacted her mother and told her she was going to do as she wished, return to school, and finish the needed education to become a professor. Moody went to see her superior to inform them of her pending departure back to academia. He told her that leaving would be a terrible mistake and that this was her "cup of tea." He informed her that there would always be more targets and messages to intercept. Moody took time to mull over his words and think about her future. She returned to him and was rewarded a position in research and development.

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[199] O'Rourke, National Security Agency.
[200] Caracristi, National Security Agency.
[201] Moody, National Security Agency.

However, not all codebreakers were brought back or kept in the intelligence and communications sector after World War II.

Those that ran their original course of duration plus six months, or felt that their time with communications was over, headed back home. Many codebreakers, even those that stayed on, spoke about a speech given to them by Colonel W. Preston Corderman. The Colonel, who was commander of the Army's intelligence security agency, [202] informed the cryptanalysts of their future at Arlington not long after the war's end. One codebreaker referred to the lecture as Corderman's famous "here's your hat, what's your hurry?" speech.[203] He thanked the workers for their efforts and, in the politest way possible, told them that it was time to go.

Stringfellow recalled leaving Arlington Hall shortly after the war.[204] The Winthrop College cryptanalysts thought about continuing or finding work elsewhere, but she was released. Friends began leaving the city, causing her to depart as well. Stringfellow felt a certain sadness about coworkers departing. She had become close with these women, and they were leaving, and so was she. The ex-codebreaker returned to Chester, SC, as Arlington Farms began to downsize. Stringfellow started her teaching career that would span for nearly forty years. WAVE Helen Allegrone showed no interest in continuing her military service and cryptanalysis occupation.[205] After being discharged

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[202] Robert Louis Benson, *A History of U.S. Communications Intelligence during World War II: Policy and Administration,* (Fort George G. Meade, MD: Center for Cryptologic History, National Security Agency, 1997) 80.

[203] Moody, National Security Agency.

[204] Stringfellow, interview by author.

[205] Allegrone, Women Veterans Historical Project.

as an officer, she wanted to get married and have children. When codebreakers left the intelligence community, they returned to normal civilian life after an existence of extreme secrecy, working away from home and military living.

Female codebreakers gained a well of experience during World War II. Military service and involvement in codebreaking operations changed the facets and ideologies of young women's lives. Kirkpatrick claimed that the military helped her gain independence and leave home. She stated that she was a homebody and that " if I hadn't come across the outside world coming in the way it did, it might have been harder for me to make the break from home."[206] The WAVES opened up an avenue of freedom and pushed her from her comfort zone. Kirkpatrick's military service opened up the wealth of opportunities offered away from home. WAVE Hanke experienced a similar situation when reflecting on her military career.[207] She claimed that if she had not joined the armed services and the cryptanalysis operation, she would have married young and ended up existing solely as a housewife. Hanke would not have had the opportunity to travel and or come in contact with professionals in the cryptanalysis field.

World War II drew to a final and official end in 1945. Six years of fighting ended with the surrender of Nazi Germany in May and the following surrender of Japan in August. Codebreakers rejoiced over Germany backing away from the war, but V-J Day was their real victory. Young women celebrated in any way they could when news of the surrender echoed through Washington, D.C. They held improvised festivities while

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[206] Kirkpatrick, Women Veterans Historical Project.
[207] Hanke, Women Veterans Historical Project.

working and later filled the streets of the nation's capital, dancing, singing, and celebrating their efforts. However, as the war dwindled, codebreakers wrapped up projects and jobs at their military facilities. Some stayed on working in the intelligence community. They were reassigned or departed briefly before returning to tackle the ever-growing Soviet problem. Others finished their codebreaking careers in 1945, never to return to cryptanalysis. Codebreakers were told that it was time for them to go, get off the government payroll, and continue with their lives elsewhere. Many of the departed returned home to work and marry or left with their husbands. It was leaving signified a return to normalcy. Codebreaking and military service created new avenues for these young women. Working in the cryptology field during World War II allowed them independence and a chance at detaching from traditional roles.

Conclusion

It has been seventy-five years since the end of a raging global conflict that changed the landscape of Europe and history. It has been seventy-five years since young female codebreakers of World War II smashed enemy ciphers and used their skills to test American codes. Most future codebreakers were immersed in an atmosphere of conflict while attending college or working in the education field. While at college, many young women were exposed to the impact of war and tragedy. Perhaps the most crucial facet occurred while in academia. Through programs with the United States Army and Navy, academic institutions began teaching cryptology courses. College campuses became an epicenter for recruitment for crypt sectors. They housed educated, morally sound women who had some cryptanalysis instruction, and they also served as training bases for female armed services branches. Winthrop College in Rock Hill, South Carolina, became one of these facilities during the home front war effort. Once recruited through academic institutions or their own volition, women headed to military facilities.

At these government buildings, female cryptanalysts got down to work and actively impacted the war effort. At Arlington Hall, the Naval Communications Annex, and the Norfolk Shipyard codebreakers participated in a multitude of programs and interacted with different people and places. Codebreakers were offered room and board on government property while working with Army and Navy crypt units. They came in contact with categories of people they typically would not. White female cryptanalysts rubbed elbows with African Americans, military personnel, and men. Working alongside these groups sparked some resistance, but mostly parties were able to get along.

During World War II, young women were intrinsically involved in winning the war. They participated in the massive home front force and were engaged in breaking important Axis messages. The secrecy they were kept to while working on ciphers was paramount and something that would follow them through their entire careers. Upon hearing about Nazi Germany's and Japan's surrender in 1945, codebreakers were flooded with a multitude of emotions and thoughts. Happiness was the primary emotion as the nation celebrated the end of the war. However, this victory left many intelligence workers wondering what would come next. Influenced by the collective atmosphere and motivated by their patriotic ideology, young women left their traditional roles behind and actively impacted the war effort.

Academia played a huge role in World War II codebreaking operations. Most future codebreakers were exposed to the war on their college campuses. They set the stage and set the mood. Colleges across the nation, like Winthrop College, hosted war programs, gearing women up for future sacrificing and patriotic ideologies. Campuses saw the early mobilization and creation of female actors during this conflict. Winthrop College introduced many war-related programs. Women participated in social drives like Bundles for Britain, and the college hosted male Army Air Cadets. The December 7 attack on Pearl Harbor, Hawaii, ignited United States involvement with the "European war." This shocking entry saw males leave the nation and the campuses. Their departure runs parallel to women filling their positions at military facilities. The environment and atmosphere that future cryptologists operated and mobilized in were crucial to their future actions.

The seeds of cryptology were planted early at college campuses. Programs were implemented by the United States Army and Navy for colleges to teach young educated women in cryptanalysis courses. Through their interaction with academia, the armed services created a wealth of resources in the shape of workers and training facilities. Academia, war, and military, especially the WAVES, were instinctually intertwined. The WACs and WAVES became tools for women to get involved officially. These organizations recruited women from colleges, held basic on campus grounds, pulled instructors to work in their crypt sectors, and housed their intelligence communities in defunct or conscripted academic institutions. Colleges recommended past and present students to the armed services. Winthrop College taught cryptanalysis courses, preparing women for the war effort, on behalf of the Army.

College campuses were not only recruitment grounds for female cryptanalysts and instructors, but they also served as training grounds. During this period, a militarization of campuses occurred. At Winthrop College, the student newspaper included stories of war, sacrifice, and charity in every addition. Advertisements to join the WACs were published, and interviews with WAVE ensigns encouraging girls to join were printed. The male Army Air Cadets marched along the brick covered walkways, saluting girls rushing to class. However, this militarization of the college campus was necessary. Male students and instructors were departing campuses at accelerated rates. A drop in students created a reduction in tuition and academic officials, who helped run colleges, left for the war effort. Their vacuities created a power vacuum that female officials could fill. Some instructors were entirely in line with patriotic ideologies and felt the pull to help. Dr.

Ruth Stokes, Winthrop College's math department head, showed a fervor to support the war effort. No matter the cost, Stokes attempted to solicit more funds for instructors and more clandestine war-themed programs. Campuses facilitated the extreme secrecy that future female codebreakers would have to embody. They were keeping vague records of cryptanalysis courses, and their students kept in line with secretive military practices. Encouraging the girls to do the same due to the chance of punishments levied at their institution, translated into codebreakers keeping quiet for national security. College campuses functioned as stepping-stones from traditional academia to military service and facilities.

After leaving college campuses, women traveled to government buildings to start their work in Army and Navy intelligence units. Their departure signified a change in their roles and exposed newfound freedoms. Codebreakers broke away from Army and Navy facilities to explore Washington, D.C. They encountered a multitude of events, came in contact with interesting figures and visited fascinating places. Once the war concluded with Nazi Germany's and Japan's surrender in 1945, women reflected on their experiences. Military service and cryptanalysis work allowed female codebreakers a certain degree of independence. Many were far from home, parents, and their traditional structures. Instead of becoming a young housewife, a woman became a codebreaker at clandestine military facilities.

Venturing out to the nation's capital put them out into the world. Women were introduced to military ideologies, something they bumped up against at times. This signified an entrance into a new division of society. While some male workers showed

disdain to their arrival, most codebreakers stated that gender dynamics were not an issue. Both men and women worked to end World War II. Communally shared feelings of patriotism and the goal of safety for American soldiers superseded traditional gender norms.

Female codebreakers played essential roles in cryptanalysis sectors during World War II. They broke enemy ciphers, tested American codes, and organized and delivered messages to important officials. Codebreakers worked around the clock in hot, humid D.C. weather to keep the crypt unit functioning. At times, without water in their dormitories or lying in bed sick, codebreakers continued the fight from the home front. They operated as an essential unit, one that took the secrecy and risks of their jobs seriously. Women took the responsibility of silence on behalf of their nation and soldiers gravely. Any small slip of the tongue and crucial information could be captured by enemy forces, leading to catastrophe for the United States. Codebreakers' silence was indispensable, and the women succeeded in protecting the nation in silence. Their presence created a constant underflow of devoted workers. Involved in changing important battle plans and in the sinking of enemy ships, cryptanalysts were on the front lines of cipher clashes and the war effort.

Young college-aged women naturally became engaged in the war effort during World War II. Academia fostered and housed future codebreakers, training bases, and cryptanalysis facilities. College campuses and officials facilitated young women's involvement with American crypt units. Female codebreakers became important assets to the Army and Navy during such a tumultuous period. They guarded their data and

actively participated in smashing vital codes. Fueled by their political ideals and the

desire to support their nation at war, women codebreakers were key players in both the

intelligence community and in ending the Second World War.

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