No Room for Gentlemen: Cryptography in American Military History

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Gentlemen do not read each others' mail
-- Henry Lewis Stimson[1]

For as long as profitable gain, political disputes, and warfare have existed, cryptography has existed. Cryptography is the contemporary term describing the art of writing messages with hidden meanings. In modern society, cryptography is used every day. When applied to cell phones, computers, and credit cards, cryptography allows personal information to remain personal. Though it is used frequently throughout the world, it is not a new invention. In fact, prior to the nineteenth century, the use of these codes and ciphers was most often referred to as encryption. Encryption, the act of creating a code or cipher, is a practice millennia old. It exists in diverse forms and cultures throughout the world and usage spans thousands of years. Through encoded messages called ciphers or codes, Egyptians, Romans, Greeks, and Hebrews could keep classified information out of the wrong hands.

In its beginning, cryptography was not a tool of governmental power like it is today. Codes and ciphers, mostly created for personal use, once had more common applications, such as keeping the directions to an ideal fishing hole a secret. In many ways, a written language itself was the earliest form of encryption.[2] For hundreds of years the words and pictures of a language were encrypted messages. These "ciphers" were not traditionally made, that is they were not created to be secretive. Few people had the ability to read and write. So, a written language was a highly effective type of cipher, used by the few who could read and write it, that went unsolved for hundreds of years due to widespread illiteracy. As literacy spread the need for a new type of secrecy emerged. Purposefully made ciphers were created to ensure messages remained a mystery. These basic ciphers used an encrypting technique that shifted letters in alphabets.[3] Some of the most basic

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[1] Henry Lewis Stimson and McGeorge Bundy, *On Active Service in Peace and War, Volume II* (Pennsylvania, Harper, 1971), 188.

[2] Gary Blackwood, *Mysterious Messages: A History of Codes and Ciphers (*New York, NY: The Penguin Group, 2009), 5.

[3] Joseph Stanislaus Galland, *An Historical and Analytical Bibliography of the Literature of Cryptology* (New York, AMS Press, 1970), 17.

coded messages need very little encrypting to confuse and conceal. For example, what is known as the Rail Fence Cipher merely shifts every other letter vertically. To decipher the message, one would read the letters in a zigzagging fashion.[4] As these methods became commonplace, more elaborate codes were developed. These ciphers transformed from simple letter arrangements to comprehensive, mathematically based codes that only skilled cryptanalysts, with the aid of codebooks could decipher.

Not war in history is free from cryptography. Without it, the past would have an extraordinarily different story. This being said, America is no stranger to cryptography. Present on United States soil even prior to its separation from Britain, cryptography surfaced in each major American war, including the Revolutionary War, Civil War, World War I, and World War II.[5] Codes and ciphers are perhaps one of the military's most influential weapons. A code or cipher allows covert intelligence to pass undetected and are a necessary part of long distant communication. And although communication is generally secure, decryption by outsiders is an ongoing concern amongst cryptographers. As a result, new ciphers, ones created with precision and careful thought, are produced to fight against unwanted decoding. Though not an instrument of physical force, cryptography's power lies within its utilization of logic, thought, and secrecy. It is a powerful and fundamental weapon at the center of America's military history. Through the use of codes and ciphers, the United States evaded destruction, prevented battles, and won wars.

Secrecy was a major factor that led to the success of the American Revolutionary War. Numerous occasions have warranted cryptography as the tipping element in American victory.[6] At the forefront of all the mystery was General George Washington, who understood the importance of encrypted messages. He relied upon them to send information to his agents in the field. Though at first Washington and his staff's ciphers were primitive at best, they soon improved through dedicated practice. Washington played both "offensively" and "defensively." His offensive attacks were through deception, his greatest ally.[7] Washington was known to have sent out phony telegrams in hopes that British spies would intercept them and believe them truth. In one of his letters to James Madison, Washington tells him of the false

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[4] Martin Gardner, *Codes, Ciphers and Secret Writing (*New York, NY: Simon and Schuster, 1972), 11, 13.

[5] Ronald Lewin, *The American Magic Codes, Ciphers, and the Defeat of Japan (* NY: Farrar Straus Giroux, 1982), 25.

[6] Walter R. Haefele, "General George Washington Espionage Chief," *American History* 1 (1991): 42-44.

[7] Ibid., 42.

messages he had his agents send out into circulation to fool the British.[8] Within another message written in invisible ink, made using lemon juice and decoded by Madison, Washington discusses the secret journals in which many codes are written and where detailed records are stored. Written in other letters, Washington emphasizes to Madison the need for obtaining British military intelligence on battle location and outposts. [9]

Perhaps cryptography's most significant moment in the Revolutionary War came from one of the most famous traitors in American history: Benedict Arnold. Arnold was surrounded by ciphers.[10] After having developed a negative feeling about the future of America, Arnold began his plot to switch sides. He expressed much grief over the "horrid" situation within the country as well as his discontent of the armed forces.[11] He foretold in a letter to General Nathanael Greene that he saw "impending ruin" in this country's near future.[12] Soon, with his mind made up to switch sides from the Continental Army to that of the British, Arnold began secret correspondence with a British spy named John Andre. Arnold crafted elaborate plans to ensure this communication remained secret. With the use of encrypted messages and the help of his wife Peggy, Arnold was able to pass along letters to Andre depicting his plot to voluntarily surrender West Point, where Arnold was stationed, to British troops. If employed, this surrender would weaken the power of the Continental Army. Arnold was also supplying the British with highly confidential troop locations as well as the strengths and weaknesses of the Continental Army.[13]

This secret communication did not last forever; Arnold's plot was discovered before it was too late. He was found out by giving Andre passes through the Continental Army's lines, as he was British.[14] In order to safely leave the country, Arnold gave Andre passes to escape through Continental Army lines. He also received a letter illustrating the details of the planned surrender at West Point form Arnold. A few days after Andre set out, he was captured, interrogated, and the plan exposed. This was a huge blow to Washington's trust, Arnold having been in his confidence.[15] Immediately, Washington set troops to capture

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[8] *Washington-Madison papers collected and preserved by James Madison (*Philadelphia, PA: Publisher unknown, 1842), 80.

[9] Ibid.,1780.

[10] Ibid., 1780.

[11] Haefele, "General George Washington Espionage Chief," 41-42.

[12] Ibid.,45.

[13] Barry K. Wilson, *Benedict Arnold: A Traitor in Our Midst* (Quebec: McGuille-Queen's University Press, 2001), 100.

[14] Ibid.,161.

[15] *Washington-Madison papers*, 1779.

Arnold, but he was never caught and went on to serve for the British forces.[16] Had Arnold's plot to surrender West Point succeeded the Continental Army would have faced devastating consequences through the loss of a vital military base.

Moving out of the eighteenth century and into the nineteenth century, America still found great use from cryptography. The Civil War was the earliest American war where telegraphs were used. Telegraphs gave the Union and Confederacy incomparable abilities in increasing the frequency and alacrity by which messages were received. However, this new technology posed one problem: easily tapped lines caused enemy intelligence to readily seize information without detection. As a result, armies of the Union and Confederacy found a simple solution in cryptography. Both sides of the war incorporated cryptography into their weapons arsenal. Most of the ciphers and codes came to pass as basic in comparison to other ciphers in use during the mid nineteenth century, but still proved effective.[17]

Prior to the initial start of the war, the United States War Department was made up of a single man dedicated to the area communication.[18] A major in the U.S. armed forces, Albert J. Myer was in charge of developing the department to include greater means of covert communication techniques.[19] Though Myer was intrigued by ciphers and cryptography, he was more devoted to improving strategic flag signaling. As a result, the department was at a near standstill until after the war between the states erupted. Needing to once again build up the communication branch, the War Department quickly began seeking skilled men.[20] After several months of searching and inquiry, Anson Stager, co-founder and general superintendent of Western Union Telegraph Company was the man called to Washington. Stager eventually designed the cipher adapted by the Union army.[21]

Unlike the easily cracked ciphers at the beginning of the war, this cipher was different. By altering a Scottish transformation cipher some two hundred years old, Stager was able to construct an effective cipher that went undecoded by Confederate forces.[22] The transformation cipher was a simple technique to use. It worked by keeping words in an unaltered text form. By modifying syntax structure, it allowed the message to result in a jumbled mess of words. "Null words," or words void of meaning within the note, also added to further confusion by any

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[16] Wilson, *Benedict Arnold*, 161-163.

[17] Michael, Antonucci, "Code Crackers: Cryptanalysis in the Civil War," *Civil War Times Illustrated*, 34 (1995): 46.

[18] Blackwood, *Mysterious Messages: A History of Codes and Ciphers*, 93.

[19] Antonucci, "Code Crackers," 47.

[20] Ibid., 47.

[21] Ibid., 47.

[22] Ibid., 48.

interceptor.[23] Only the receiver of the coded telegram would know how to make sense of the scrambled message. A receiver would have a standard key to decode it. Taking the first word written in the text, which they knew to always be a null word, they would match its corresponding number from the key. This number indicated how the receiver should rewrite the message in order to decipher its true form. Whichever number matched the word on the key, the receiver would reconstruct the message by writing the words onto a grid with a certain number of rows and columns. Skipping known null words, they would then read the decoded grid.[24]

There is much speculation as to why the Confederacy did not crack the Union cipher. By merely looking at the encrypted telegrams, along with a little dedicated time, one could easily understand what the sender had written. The Confederate army also intercepted scores of Union messages and even succeeded in apprehending a couple of Union codebooks.[25] So why did the ciphers go uncracked? Little is known as to why. Many historians merely assume that the Confederacy was too engrossed with the use of spies to bother with encryption. They found the use of undercover agents as more efficient means of covert affairs rather then risk the possible capture of information. However, this is not to say that the Confederacy went completely without both encryption and decryption. A confederate man, named Charles Gaston, traveled behind enemy lines and managed with a small force of men to openly tap into Union telegraph lines and obtain encrypted messages.[26] Once arriving back at the Confederate capitol, Richmond, Virginia, however, an unorganized department of cryptology and insufficient support put officials at a loss as how to go about decoding the messages. Southern military lacked skilled cryptanalysts save one named Edward Porter Alexander. Alexander was an intelligent Southerner trained in cryptology.[27] At the time of Gaston's return, Alexander was busy assisting General Robert E Lee as an artillery officer. As a result, the decoding of the ciphers never occurred.

Though it does appear that these ciphers were overlooked, Southern newspapers reported to have encrypted Union telegrams with rewards in hopes of enticing citizens to find their answers.[28] Not much is known about the reasoning behind these printings. Some historians believe them to be a ruse, made by the Confederacy, hoping the Union would think them unsolved. This way, the North would continue to use

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[23] Blackwood, *Mysterious Messages: A History of Codes and Ciphers*, 94-95.
[24] Ibid., 95.
[25] Antonucci, "Code Crackers," 48-49.
[26] Ibid., 50.
[27] Ibid., 51.
[28] Ibid 51.

these ciphers and, unbeknownst to them, the Southern cryptographers would be able to decipher them.

Nevertheless, the Union War Department, located along side the White House in Washington D.C., expanded considerably. Unlike the Confederacy, who obviously underappreciated the advantages of encoding and decoding messages, the Union relied upon it. David Homer Bates, Charles A. Tinker, and Albert A. Chandler, though only in their early twenties, were the most knowledgeable and qualified cryptologists at the Union's disposal.[29] President Abraham Lincoln regularly visited the department, reading the decrypted messages from the "Sacred Three," as Bates, Tinker, and Chandler were called. While not many in his cabinet were interested in cryptography, Lincoln was. He saw the benefits of encrypting and commended the "Sacred Three" on their dedication and labor.

The three men's most noteworthy achievement, and perhaps the greatest intercepted cipher of the war, took place in December of 1863. After intercepting a letter addressed to Alexander Keith—a known contact of the Confederacy—Bates, Tinker, and Chandler went to work.[30] The messages developed by using sets of cipher symbols common to effective encrypted messages. This message revealed a Confederate spy ring based out of New York City. The Confederacy had constructed the machinery capable of making money. The three immediately sent word to officials who raided the shop housing the machines.[31] Because of their swift decoding, the Sacred Three prevented the Confederacy from receiving the machine. With the interception of ciphered messages, Union forces kept from the Confederacy a vital facet in making secession lasting: the tools needed to print currency. Though the Confederacy's economy appeared to be in shambles due to over production of bills and the capture perhaps helped prevent further destruction, this allowed the Union to print counterfeit bills, a much needed asset to the Union's undercover work. Had the Union not discovered the spy ring, the Confederacy's espionage work in the Union army would have succeeded in obtaining their classified information.

Some fifty years after the end of the American Civil War one cipher caused a declaration of war. After receiving notice of an enciphered telegram, the United States entered into a war in which they initially had no involvement. On January 17, 1917 British intelligence intercepted a telegram heading for Washington D.C. Although its message was encrypted by numerals, nothing was remarkably different about this particular message other than its source: Germany. The

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[29] Blackwood, *Mysterious Messages: A History of Codes and Ciphers*, 98.
[30] Antonucci, "Code Crackers," 51-52.
[31] Ibid., 52.

message was handed off to the cryptanalysts of Room 40, Reverend William Montgomery and Nigel de Grey, for decoding.[32] While deciphering the numerals one day, a number at the top of the page caught the men's attention. They recognized the construction of the cipher as indeed German, a cipher of which they had previously encountered on numerous occasions. Taking out a book of translated German numerals, Montgomery and de Grey began the painstaking decoding process.[33] The men then began isolating the signature of the telegram.

After some lengthy concentration, Montgomery and de Grey succeeded in changing the numbers to the name Zimmerman, a name they identified as German Foreign Secretary Arthur Zimmerman.[34] As they furthered their examination, however, the two men noticed there was more to the telegram than originally perceived.[35] Strange phrasing such as "For Your Excellency's personal information" and "Most secret" led them to believe that the telegram was intended for Count von Bernstorff, the German Ambassador in Washington D.C. As other words were decoded, such as "Mexico" and "us and Japan," the men began to work with swifter urgency. [36] After several hours of dedicated toil, the telegram became abundantly clear. What was concealed within the numerals of the message would change the course of First World War.

The telegram was constructed in two parts: one part intended for Count von Bernstorff, the German Ambassador in the U.S., and one intended for Heinrich von Eckhardt, Imperial German Minister in Mexico. Bernstorff's portion depicted the German's want of unrestricted U-boat warfare. Von Eckhardt section took a greater amount of time to decipher.[37] After days of persistent struggle to solve the telegram's puzzle, Montgomery and de Grey uncovered the most startling news yet. Von Eckhartdt's segment declared that Germany would assist Mexico in "[regaining] by conquest her lost territory" on United States' soil, specifically the states of Texas, Arizona, and New Mexico and that, should the United States enter the war, Eckhardt was to hand the message over to the Mexican government.[38]

President Woodrow Wilson gave Germany access to the Western Hemisphere, and he did this in hope of remaining neutral, as he believed the end of the war in Europe would come swiftly. However, Germany

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[32] Barbara W. Tuchman, *The Zimmerman Telegram* (NY: Dell, 1963), 3.

[33] Ibid., 4.

[34] Ibid., 5.

[35] N.D. Scott, *The Zimmerman Cypher*. (United States of America: Trafford Publishing, 2010), ix.

[36] Tuchman, *The Zimmerman Telegram*, 4-6.

[37] Ibid., 8.

[38] Ibid., 100.

took advantage of the president's hospitality.[39] By using the telegraph wires to easily send hypersensitive information to German officials within the United States, they could do so with out detection since the British would not want to openly admit to tapping into American telegraph wires. Another problem facing the British was solving the code. How could they relay the message without tipping off Germany that their cipher had been cracked? The answer came from Mexico. A British undercover agent enticed a Mexican communication's officer to slip him a copy of the message as well as the decoded version. This way, British intelligence could truthfully say they had received the message via Mexico, as well as the decoded version.[40] Germany bought into this lie and continued using the Enigma.

British intelligence officer William Hall showed Edward Bell, an American government official from the United States Embassy in Britain, the telegram.[41] From there the message was passed along from official to official and eventually to President Wilson. Some thought it was a hoax concocted by the British Government to entice the Americans into the war. The press eventually acquired the message, and it outraged the American public.[42] Already having negative feelings toward Germany due to German-Americans supposed sympathy of the war, American citizens grew angrier. Though not the sole reason behind entering the war, receiving this encoded telegram was indeed a determining factor. The discovery of this information, though not uncovered by Americans, led to the United States' entry into the First World War.

Barely twenty years post World War One, America was going to need cryptography yet again. Enigma, a machine used by Nazi Germany throughout the 1920's and the beginning of World War II, remained unbroken. The Enigma enciphering machine was known as unbreakable because of its many years of use and a decade's worth of attempted decoding.[43] Following Enigma's decoding, America, had yet to find an unbreakable code, felt that Enigma's defeat gave them an opportunity to search for the unbreakable cipher. However, the codes and ciphers discovered after this time showed little improvement. After several years passed with no advancement, a single event, an attack made by Japan, changed the course of cryptography.

Subsequent to the attacks on Pearl Harbor, the United States entered into war with Japan. Due to the many hundreds of miles of water lying between the United States and Japan, radio messaging was

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[39] Tuchman, *The Zimmerman Telegram*, 130.

[40] Ibid., 184.

[41] Ibid., 182, 201.

[42] Ibid., 169.

[43] Blackwood, *Mysterious Messages: A History of Codes and Ciphers*, 141.

crucial for the military. Having developed wireless radios, communication between regiments and other allied forces became swifter and easier for troops.[44] Little did the Americans know, the Japanese military had a few tricks of their own. By using English-speaking soldiers, the Japanese were able to listen to American airwaves, obtaining confidential information. In attempts to combat enemy hacking, American troops were instructed to encode all outgoing messages. This worked for a time until Japanese cryptanalysts were called into action.[45] Realizing that their airwaves were no longer safe, the U.S. neared desperation for seeking an encryption technique Japan could not break.

The solution came not from the military or even cryptographers. The answer turned up from an engineer out of California named Phillip Johnston. Having been raised on a Navajo reservation, he understood the language well. Through this understanding he knew it to be entirely impenetrable to decoding. Lucky for Johnston, he was correct. With his keen insight and knowledge, he led the American armed forces to find the only code to ever go unbroken.

The Navajo are a Native American people who populated the southwestern parts of the United States. Though an old culture, the people maintained many traditional customs over hundreds of years. Navajo are highly spiritual individuals and skilled in numerous arts, such as silver work and weaving. Another art the Navajo use is there language, which is a descendent of one of the southernmost sections of the North American Athabaskan languages.[46] Over the centuries, the language continued to thrive throughout the Navajo peoples. Looking around the Navajo Nation, one will see a large absence of written language; Navajo had little to no need for their language to be written. Unlike European cultures, which had hierarchical governments and organized religious practices, the Navajo had neither of these. Navajo language was taught by word of mouth. Because of this, very few non-native people understood the language.[47] Johnston recognized the Navajo language would make for the perfect coded messages, and the United States government agreed.

The Navajo language is a difficult one to learn. Each syllable holds different meaning, as do tone and pronunciation. Due to this, the language must be faultless in presentation or else it is spoken incorrectly.[48] This makes mastering the language very demanding and explains why so few outsiders spoke it. Johnston, having taken all these

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[44] Nathan Aaseng and Roy O. Hawthorne, *Navajo Code Talkers* (New York, NY: Walker Publishing Company, 1963), 8.

[45] Ibid., 9.

[46] Ibid., 12.

[47] Ibid., 12.

[48] Aaseng, *Navajo Code Talkers*, 11.

issues into account, spoke with army representatives about the benefits of using Navajo, or Code Talkers as they are commonly called. Initially, they did not have faith in Johnston's pitch. Marine Corps troops had previously used Choctaw language during World War I to no avail.[49] Japan like many other nations around the world had begun to take interest in Native American cultures and as a result had picked up on the Choctaw words streaming from tapped wires. Eventually, Johnston convinced Marine Corps officer James Jones and Washington D.C. officials to use the language of the Navajo because it remained unwritten.[50]

Accordingly, Navajo men who could speak and understand both Navajo and English were called to arms and a code was created. The cipher worked by Navajo speaking soldiers using pre-agreed upon words in Navajo to describe English military terms. The material and texts taught to these men never left the training rooms. This further prevented outsiders from obtaining information. As Johnston foretold, the Navajo language stumped the Japanese, and even other Navajo, if overhearing conversations of radio, would take notice of an endlessly obscure list of words.[51] The Navajo were celebrated for their service during the war. Although it is no longer used today because it was purposefully unveiled many years later to the public, the Navajo code remains the only military cipher to go unbroken. The Navajo proved the United States' secret weapon because of their dedication, hard work, and their cipher, the Code Talkers helped America win the war.

Thousands of different codes and ciphers are known to man. Hundreds more are added every year. These ciphers differ in creation methods, but are all similar in their secrecy. A cipher need not require overly complex methods to prove effective, as the cipher created by Anson Stage shows, even a cipher hundreds of years old can stump the enemy. They have been the tipping factors in many successful battles from the Revolutionary War and even that of the twentieth century Code Talkers. Through the use of codes and ciphers the history of the United States took shape. Cryptography has many defining moments in American military history. Though easily looked over due to its simple and inconspicuous form, cryptography is a small, yet silent weapon that has the potential to alter the world.

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[49] Ibid., 11.
[50] Blackwood, *Mysterious Messages: A History of Codes and Ciphers*, 142.
[51] Ibid., 143- 144.