Codes and Signals:
Breaking the Spy Games of World War II and the Vietnam War

Agnes Meyer Driscoll
U.S. Navy WWII Code
Breaker and Spy

CONFIDENTIAL

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INTRODUCTION

The United States Navy has used secret codes and signals throughout its history. The enemy is always looking to steal information, so the U.S. Navy must use secretive tactics to ensure we are always one step ahead! Today, we will be learning about a few code and signal strategies people have used in the past. We will use what we learn and use that to solve a scavenger hunt.

During World War II, military and civilians alike were always aware of secrets and information about strategy and movement of the U.S. military. A lot of people held information the enemy could use to destroy Navy Ships, or worse, target sailors. This being said, the U.S. government sent out short videos that would play before movies in theaters. These videos would alert viewers of the importance of keeping secrets.
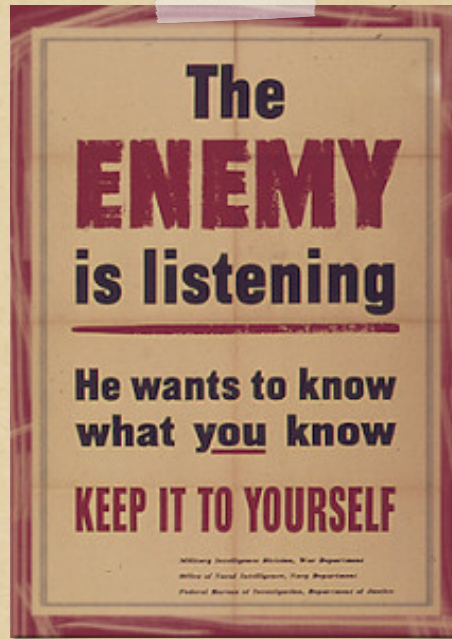
The United States was always looking to learn the secrets of our enemies as well. Specially trained spies, who often spoke many languages, would **infiltrate** enemy lines to learn as much as they could and send that information back to the U.S. to help stop the enemy. American spies would use secret notes and codes to **relay** information. The **Imperial** Japanese Navy and the German **Imperial** Navy would use complicated codes to communicate, and **cryptographers** would do their best to break those codes in order to defeat them.

On the next page, you are going to learn about a very important code-breaker named Agnes Meyer Driscoll. She worked for the U.S. Navy during WWII to break the **Imperial** Japanese codes and learn their secrets.
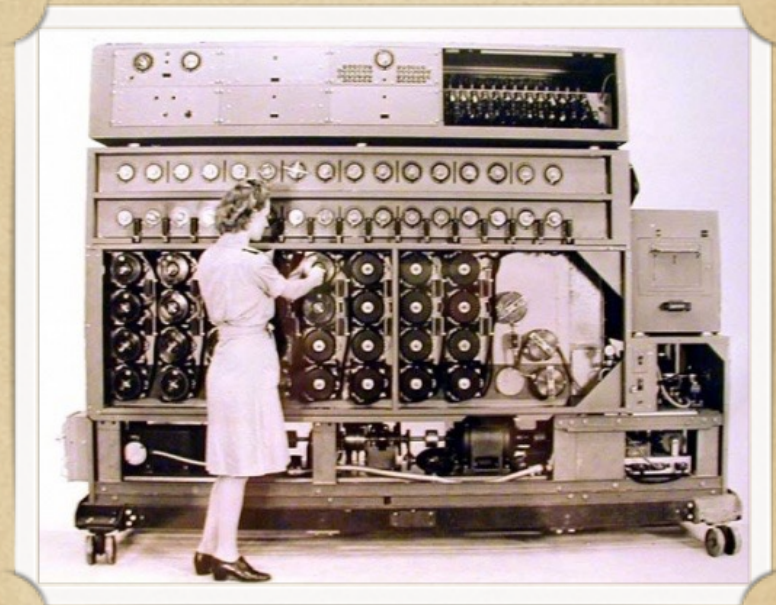
What do you think this machine is? Would you believe that it is a computer? Computers like this, called a bombe, were used to crack Japanese and German codes during WWII.

Agnes Meyer Driscoll

Agnes Driscoll was an American **cryptographer** and is famously known as the first woman of her kind in the U.S. Navy. She was born in 1887 and later went to Ohio State University. She specialized in math, physics, foreign languages, and music. In 1918, during World War I, Driscoll enlisted in the U.S. Navy, achieving the highest rank possible for a woman at the time, Chief Yeoman. She worked in the Signal and Naval Communication departments within the Navy, helping us to **decipher** secret codes and messages from the **Imperial** German Navy. Not only did she manually decipher these codes, she also helped in making machines that would decode messages much faster. These were similar to the bombe machine seen on the last page.

During World War II, Driscoll led a new group to attack the German Enigma, seen in our museum, using a manual approach. Unfortunately the U.S. and Britain did not communicate well and her attempts both were unsuccessful and had been tried by the British.

In 1943 she worked with a team to break the Japanese **cipher** Coral. It was broken two months later, although Driscoll is said to have had little influence on the project.

In 1945 she appears to have worked on attacking Russian ciphers.

After the war, she worked in an organization that we now know as the National Security Agency (NSA). She died in 1971, and in 2000, the NSA **inducted** her into their Hall of Fame.

Agnes, and codebreakers like her, have to be very good at math to do their job. Can you pass the test? Answer as many of the problems on the next page in <u>one minute</u>!

- Fluent in English, French, German, Japanese, and Latin
- Broke Red Book Code in 1926
- Broke Blue Book Code in 1930
- 1940 she made critical progress into JN-25, the Japanese fleet's operational code

Challenge yourself or a friend to answer every math problem in less than a minute! Need more time? Race each other to see who can finish first.
(Cross out equations that have not yet been taught.)

$$\begin{array}{r} 5 \\ + 5 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ - 8 \\ \hline \end{array} \qquad \begin{array}{r} 1 \\ + 2 \\ \hline \end{array} \qquad \begin{array}{r} 5 \\ \times 7 \\ \hline \end{array} \qquad \begin{array}{r} 1 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array} \qquad \begin{array}{r} 1 \\ + 7 \\ \hline \end{array} \qquad \begin{array}{r} 4 \\ + 9 \\ \hline \end{array} \qquad \begin{array}{r} 11 \\ - 2 \\ \hline \end{array} \qquad \begin{array}{r} 7 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array} \qquad \begin{array}{r} 2 \\ \times 2 \\ \hline \end{array} \qquad \begin{array}{r} 11 \\ - 5 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ - 3 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array} \qquad \begin{array}{r} 4 \\ + 5 \\ \hline \end{array} \qquad \begin{array}{r} 8 \\ + 9 \\ \hline \end{array} \qquad \begin{array}{r} 2 \\ + 6 \\ \hline \end{array} \qquad \begin{array}{r} 14 \\ - 9 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ + 3 \\ \hline \end{array} \qquad \begin{array}{r} 1 \\ + 8 \\ \hline \end{array} \qquad \begin{array}{r} 7 \\ - 4 \\ \hline \end{array} \qquad \begin{array}{r} 11 \\ - 7 \\ \hline \end{array} \qquad \begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$$

Answers available upon request.

Let's make a Scytale!

A **scytale** is used in cryptography to send secret messages. Scytale was invented by the Greeks and was used to communicate privately during military campaigns. Each scytale consists of a **cylinder** with a message written on paper or tape wrapped around a rod. The code cannot be read unless you are using a cylinder with the perfectly sized **diameter**.

Step 1: Grab a cylinder, like a paper towel roll, a pencil, or a soda can.

Step 2: Wrap masking take or paper around the rod.

Step 3: Write a message horizontally on the tape.

Step 4: Fill in random letters or other messages horizontally on the tape/paper.
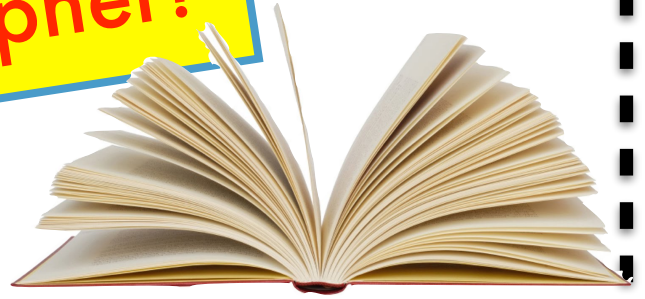
Step 5: Slowly remove the tape/paper and tack it a wall or flat surface like a table.

Place the same tape/paper onto a different sized cylinder. Can you read your secret message?

Let's make a Book Cipher!

This coding system is almost impossible for your enemies to break! All you need is two copies of the exact same book. A dictionary is a good choice, but sometimes finding a unique of interesting book will make it even harder for others to decode. This coding system was used during World War II pretty often. The book you choose will be the only way for your friends to decode, so choose carefully!

Step 1: Choose a book. Make sure that it has a lot of pages and a lot of words. These words will be the codes that you will need. A dictionary is recommended because it has all the words you would need.

Step 2: Write you message. What do you want your friend to know?

Step 3: Now, go and find the words of your message in the book you chose. You may need to think of synonyms to find your words more easily.

Step 4: Now we write the code. You will find the exact location of the words in the book and detail that. **For example: if your word is on page 21, line 17, word 7, your code for that word will be 21.17.7.** You will need to do this for each word in your message.

Try to decode the message below using this page from *Harry Potter and the Sorcerer's Stone*.

21.17.7 21.4.12 21.24.7 21.3.4

THE VANISHING GLASS

together, but it made no difference, his hair simply grew that way — all over the place.

Harry was frying eggs by the time Dudley arrived in the kitchen with his mother. Dudley looked a lot like Uncle Vernon. He had a large pink face, not much neck, small, watery blue eyes, and thick blond hair that lay smoothly on his thick, fat head. Aunt Petunia often said that Dudley looked like a baby angel — Harry often said that Dudley looked like a pig in a wig.

Harry put the plates of egg and bacon on the table, which was difficult as there wasn't much room. Dudley, meanwhile, was counting his presents. His face fell.

"Thirty-six," he said, looking up at his mother and father. "That's two less than last year."

"Darling, you haven't counted Auntie Marge's present, see, it's here under this big one from Mummy and Daddy."

"All right, thirty-seven then," said Dudley, going red in the face. Harry, who could see a huge Dudley tantrum coming on, began wolfing down his bacon as fast as possible in case Dudley turned the table over.

Aunt Petunia obviously scented danger, too, because she said quickly, "And we'll buy you another *two* presents while we're out today. How's that, popkin? *Two* more presents. Is that all right?"

Dudley thought for a moment. It looked like hard work. Finally he said slowly, "So I'll have thirty . . . thirty . . ."
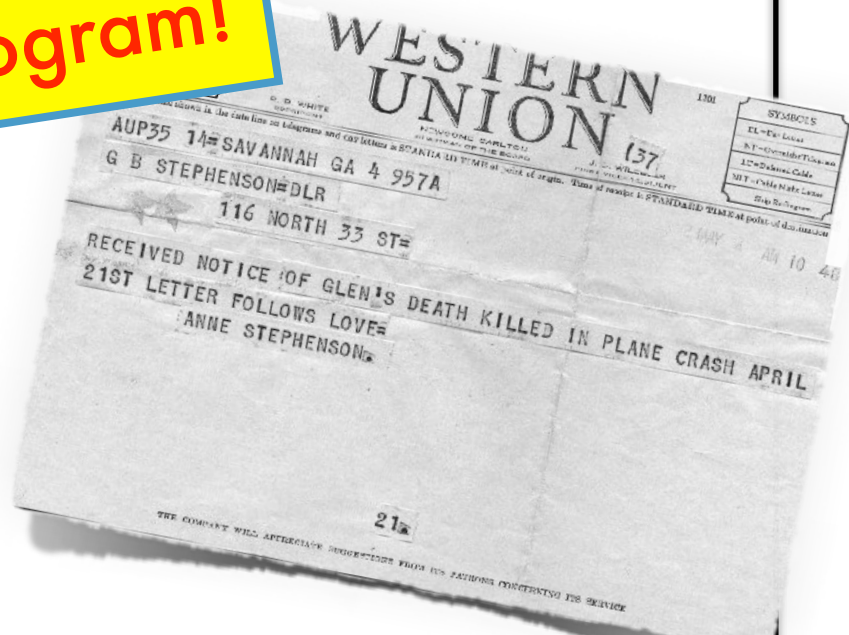
"Thirty-nine, sweetums," said Aunt Petunia.

"Oh." Dudley sat down heavily and grabbed the nearest parcel. "All right then."

Uncle Vernon chuckled.

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UNITED STATES NAVY

Let's solve a cryptogram!

During World War II, US Navy units would often have to use a telegraph to communicate with each other. Both people involved would hold a secret key to decode the messages. Use the cryptogram below to learn this message.

Use the key below to solve the cryptogram. For example, if the number **20** is below a letter, put in "**G**". Then, fill in the telegram below to send out! Remember, telegrams were always in ALL CAPS.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13	15	7	1	14	19	20	24	12	21	3	11	16	6	4	2	22	5	8	18	26	23	10	25	9	17

```
__ __ __    __ __ __ __ __    __ __ __    __ __ __ __ __ __ __    __ __
18 24 14    18 24 12 14 19    24 13 8     14 8  7  13 2  14 1     18 4
```

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__ __ __ __ __ __ .
11 4  6  1  4  6
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Write the answer down here!

Vocabulary

Cipher- a secret or disguised way of writing; a code.

Cryptographer- A person who codes and decodes messages to keep messages secret and secure.

Decipher (verb)- convert a secret code into normal language.

Imperial (Empire)- a group of countries or regions that are controlled by one ruler or one government.

Induct- to invite someone formally to a position or organization.

**Infiltrate**- to enter or gain access to get secret information.

Relay (verb)- to receive and pass on information or a message.

Fill in the following sentences with the vocabulary words you just learned.
Use <u>context clues</u> to help:

Spies during WWII would _____ secret enemy's

_____ and _____ the message to the

US Navy. After that, codebreakers, or _____

would _____ the codes to normal language.

One famous codebreaker, Agnes Meyer Driscoll, was

_____ into the NSA Hall of Fame for her

incredible work deciphering secret _____

Japanese Codes.

Let's make a Cipher Disk!

history.navy.mil
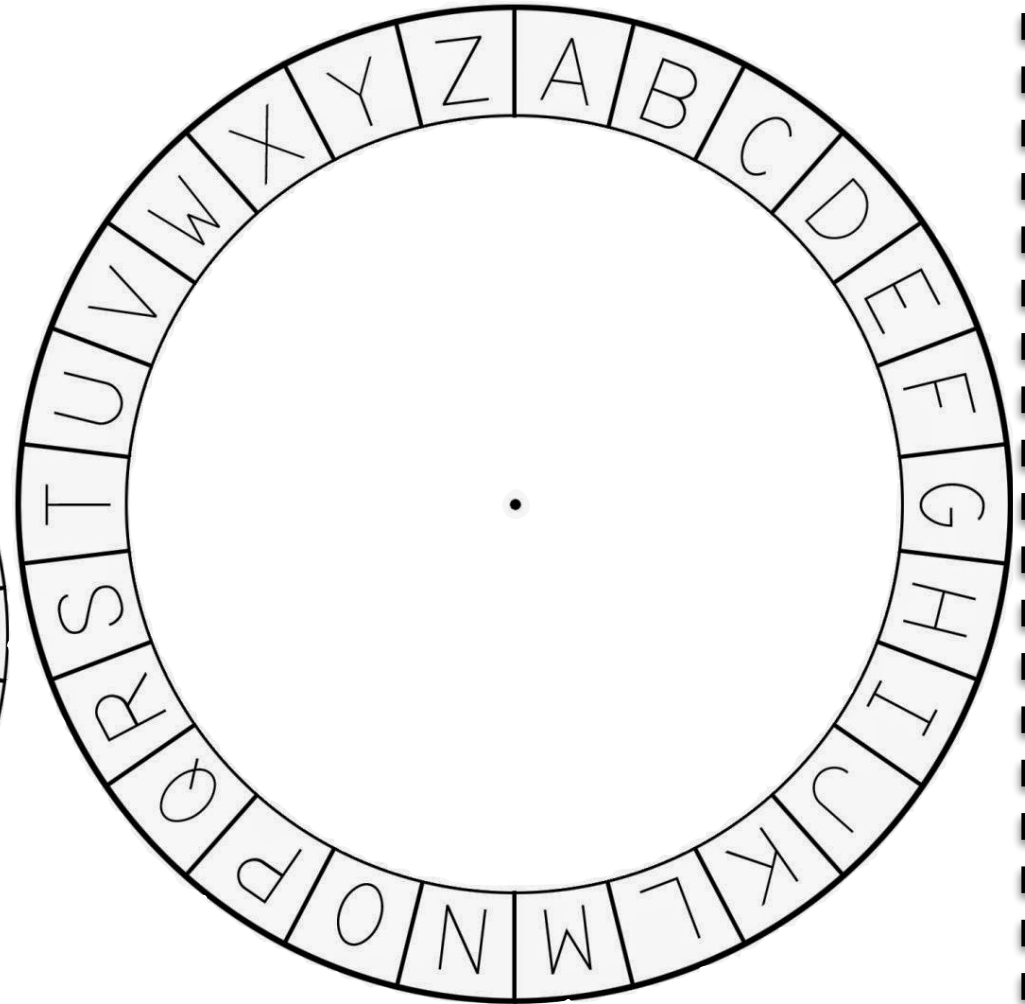
1. **Cut** out the two cipher disks.
2. **Place** the smaller disk on top of the larger disk.
3. **Attach** the disks using a paper fastener.
4. **Create** a key by choosing a letter on the small disk and lining it up on the large disk.
5. **Think** of a secret message. Find each letter on the large disk, and write down the corresponding letter on the small disk. Ask a friend or partner to crack the code using your key!

Try it out!

Sample Key:
         Large Disk= P
         Small Disk= S

Encryption(small disk): PQBJ FP XTBPLJB

Decryption(large disk): STEM ___ _____