NATIONAL ARMY MUSEUM

Operation Science: Signals

Transcript

(Close up of Morse code key - Emily is tapping out a message)

(Wider shot of Emily in front of the hat display at the National Army Museum)

If you didn't quite catch what I said, that is because I was saying hello in Morse code. Morse code is a language where dots and dashes - or dits and dahs - replace letters to send quick and efficient messages. My name is Emily and I'm a family learning producer here at the National Army Museum.

Morse code, waving flags, flashing lights, riders on horseback, smoke signals, hand gestures, but these are all things the Army has used to signal and send messages throughout its history. A signal is a sound, object or gesture that can be used to convey a notice or warning, and that is what we are going to be exploring in our video today.

But, first things first, I want you to imagine we have stepped back in time for a second. To a world where there is no electricity and, more importantly, no internet. How would you send an important message from one side of the country to another? Would you…

Post a letter?

Charter a carrier pigeon?

Or maybe place an advert in the newspaper and hope that the right person would see it?

Well, British Indian troops based on the North West Frontier between Pakistan and Afghanistan in the late 19th century also had this dilemma.

(Image of Operations in Waziristan, 1902)

They needed to be able to communicate over wide stretches of terrain *(Image of Kyber Pass with voiceover)* without the need for laying telegraph wires or relying on messengers to cross miles and miles on horseback.

(Image of heliograph signallers with voiceover)

This climate could be really challenging, but it also had some advantages such as bright sunlight and good visibility. This meant that these soldiers could use a particular piece of equipment - a heliograph.

(Footage of the heliograph being removed from its display case)

Today, we are going behind the scenes in the Museum to take a look at a heliograph on display in our Battle gallery.

(Emily is stood next to a heliograph in Battle gallery)

This funny looking contraption is a heliograph. Heliograph comes from the Greek word *helios* which means 'sunlight' and *graphein* meaning 'to write' and that is exactly what it does. It writes or sends messages using light. The idea was that soldiers based along a stretch of terrain would each have a heliograph.

It's basically three wooden legs that support a mirror, and the idea was that sunlight would bounce off the mirror and cause a flash that would be visible to other troops. Using the short and long flashes, like the dots and dashes of Morse code, soldiers could send quick and efficient messages, without the need for setting up a post office to send and receive letters. The whole

process of using a heliograph is known as signalling. For many years, British Army units undertook their own signalling duties.

(Image of Royal Corps of Signals cap badge with voiceover)

It wasn't until 1920 that a Royal Corps of Signal was formed. A corps is a very special, specialist branch of the Army with a specific role. So, for example, the Royal Corps of Signals or the Royal Army Medical Corps.

(Video clip of Morse code inserted in the corner of the screen)

Earlier on, we heard Morse code signalled using sound - it was an audio signal, where the short and long beeps replicated the dots and dashes of Morse code. The heliograph is a little bit different. It still uses Morse code, but this is instead a visual signal. You have the short and long flashes of light, instead of the dots and dashes.

For hot and sunny climates the heliograph was perfect.

(Image of heliograph team with voicover)

On a clear day you could send a message up to a 100 miles and a well trained heliograph signaller could send about 12 to 15 words per minute.

However, the heliograph was a pretty clunky piece of equipment to be carrying around with you and it was very weather dependent. So if it was hot, clear and sunny you were fine, but if it was cold, wet and cloudy - the heliograph was virtually useless.

(Image of heliograph team with voiceover)

Now, I know that the heliograph seems like a pretty old-fashioned and outdated piece of equipment to us today. However, the British Army was using this from the mid 19th century all the way through to the 1930s.

(Image of recruitment poster with voiceover)

In fact, we can even see a heliograph signaller in the background of this recruitment poster here. During the Second World War, some Australian soldiers still used a heliograph. It was a great back up in case your other forms of communication were destroyed or disrupted.

(Emily is stood infront of camouflage background)

The way the heliograph works is all to do with the reflection and refraction of light. I've set up a quick science experiment that you could try at home to find out more how light travels, reflects and refracts. So first things first, what is the fastest thing in the world? No, it's not a cheetah, it is in fact light. Light travels in straight lines at a speed of about 300,000 kilometres per second in open air. It is pretty speedy stuff.

Now, things that we see are light waves that have bounced off objects and into our eyes. Reflection occurs when a light wave comes into contact with a smooth and shiny surface and bounces off it. This is what happens when we look in a mirror, the light waves are bouncing off the mirror and into our eyes and that is why we can see our reflection. With the heliograph, the sun is reflecting off the mirror at the top and causing a flash. Refraction on the other hand, happens when light travels through a transparent substance and it appears to bend. I've set up a quick experiment that we can try to find out a bit more about how light reflects and refracts.

So, first things first, I have a glass, a jug of water and some cold hard cash - the princely sum of £1. I'm going to place the glass over the coin. Right, look what happens when I fill the glass with water. The coin magically disappears. This is because when light travels in open air not much

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refraction occurs. However, when it travels through water it becomes refracted. It appears to bend. The light waves can no longer reach our eyes and we can't see the coin. This is an optical illusion. Why don't you give this experiment a go at home.

(Emily is stood next to the heliograph in Battle gallery)

Today, we've explored the wonderful world of signals and had a go at our very own scientific magic trick. Thanks for watching and hope to see you in the Museum soon!

Images from the National Army Museum Collection used in this video

- US Air Bridge Commenorative Envelope, 23 June 1949
  https://collection.nam.ac.uk/detail.php?acc=2002-04-927-19

- Carrier pigeons in war, March 1918
  https://collection.nam.ac.uk/detail.php?acc=2003-10-9-10

- 'Union Jack' British Forces daily newspaper, Northen Italy Edition, No 140, 8 May 1945
  https://collection.nam.ac.uk/detail.php?acc=1999-08-4-49

- Operations in Waziristan, 1902
  https://collection.nam.ac.uk/detail.php?acc=1977-09-67-44

- Khyber Pass, North West Frontier, India, 1905
  https://collection.nam.ac.uk/detail.php?acc=2003-02-301-27

- Heliograph Signalling - Privates Underhill, Jones and Pope, Sollum, Egypt 1917
  https://collection.nam.ac.uk/detail.php?acc=2000-10-255-18

- Cap badge, Royal Corps of Signals, 1920-47
  https://collection.nam.ac.uk/detail.php?acc=1963-02-23-20

- Heliograph team, 1900
  https://collection.nam.ac.uk/detail.php?acc=1992-08-75-45

- Signallers from 2nd Royal Battalion (Ludhiana Sikhs) 11th Sikh Regiment, 1936
  https://collection.nam.ac.uk/detail.php?acc=1965-04-63-32

- 'Join the Territorial Army' recruiting poster, 1920
  https://collection.nam.ac.uk/detail.php?acc=1983-05-27-1