The master decoders

A wide-ranging exhibition celebrates two geniuses, one who broke Nazi codes, the other who cracked an ancient script. **Andrew Robinson** explores an unusual pairing

Codebreakers and Groundbreakers, Fitzwilliam Museum, Cambridge, to 4 February 2018

IF YOU had to guess the most indecipherable object in an exhibition about mathematics, codes, linguistics and archaeology, what would it be? The keyboard, plugboard and rotors of the 1940s Enigma electromechanical cipher machine used by German U-boat commanders? Or one of the ancient Linear B clay tablets excavated at Knossos in Crete, inscribed with recognisable numerals and part-pictographic signs such as animal heads, handled cups and chariot wheels?

No, the most mysterious object at the Fitzwilliam Museum's unprecedented pairing, Codebreakers and Groundbreakers, has no symbols.

It is a plain, slightly battered, silver teaspoon belonging to one of the two stars of the show, Alan Turing. The teaspoon was lent by King's College, Cambridge, where Turing was a student and a fellow in mathematics. He was to become the UK's best-known wartime codebreaker at Bletchley Park – and recognised as a pioneer of computing.

The teaspoon, never before seen in public, carries a paper label handwritten and signed by Turing's mother. Sara Turing writes that "This is the spoon which I found in Alan's laboratory", soon after her son's untimely death.

Cracked: the wartime Enigma electromechanical cipher machine

She adds: "It is similar to the one which he gold-plated himself. It seems quite probable he was intending to gold-plate this one using cyanide of potassium of his own manufacture."

Turing unquestionably died from cyanide poisoning in Manchester, UK, in 1954, aged just 41. But to this day, no one knows how he really died, despite informed speculation, including that of his biographer, mathematician Andrew Hodges, and of the 2014 Turing biopic, *The Imitation Game*.

"Scripts are in principle readable by anyone trained in writing the underlying language"

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Was it a home-lab accident, as his mother maintained? Or was it suicide, as the inquest concluded, perhaps provoked by Turing's 1952 conviction for "gross indecency" at a time when homosexual acts were still illegal, and he was feeling the disturbing effects of opting for hormonal treatment with oestrogen in order to avoid prison. These led Turing to tell a male mathematician friend: "I'm growing breasts!"

By strange coincidence, doubt also obscures the death of the show's other star – Michael Ventris, the man who deciphered Linear B in 1952. He died in 1956, aged 34, in a car crash, while driving alone late at night near London.

Although Ventris had depression – provoked by disappointment with his lack of artistic ability as a professional architect – the inquest declared the crash an accident. Again, what really happened remains unclear, despite the research efforts behind 2002 BBC TV drama-documentary *A Very English Genius*.

As for their research, Ventris and Turing were both working on scripts: Linear B and codes such as Enigma are both forms of writing, though separated by more than three millennia. "There is an obvious resemblance between an unreadable script and a secret code; similar methods can be employed to break both," wrote Ventris's close collaborator John Chadwick, a classicist at the University of Cambridge, in *The Decipherment of Linear B*, published soon after Ventris's death. Chadwick once confessed to Ventris that he

was "the pedestrian Dr Watson" to the master decipherer's Sherlock Holmes.

Chadwick could not say so in *The Decipherment of Linear B* in 1958, but he had an inside track on Enigma: he had been one of a group of classicists at Bletchley working as wartime codebreakers who broke Italian and Japanese codes.

Yet there are important differences between scripts and codes, even though the term "code" is sometimes loosely used for scripts such as Linear B and its still-undeciphered predecessor, Linear A. The most important is that scripts are in principle readable by anyone trained in writing the underlying language, while codes are designed to conceal their meaning from anyone who does not know the code's key, however well trained in the underlying language.

Moreover, decipherers of a script have the advantage of being able to analyse the repeated

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Iconic: one of the ancient Linear B clay tablets excavated at Knossos

patterns that inevitably occur in writing a natural language, but codebreakers cannot rely on such giveaway patterns, which are intentionally distorted during encryption.

Ventris's breakthrough was based on an inspired guess about such a pattern, on display in one of his fascinating letters – to a senior University of Oxford scholar in February 1952. This is immaculately written in English and Linear B.

In it, he guesses that a pattern of three similar, but not identical, Linear B sign-groups – spotted by a US classicist, Alice Kober, and dubbed "Kober's triplets" by Ventris – might represent Cretan towns and their inhabitants. For instance, one triplet might translate as "Knossos" + "men of Knossos" + "women of Knossos".

Decipherers are at a disadvantage because, unlike the majority of codebreakers, they usually do not know a script's underlying language. This explains why no one knew that Linear B was written in an archaic dialect of ancient Greek. Until his breakthrough in 1952, Ventris had backed a non-Indo-European language, Etruscan.

By contrast, Enigma messages could be safely assumed to encrypt German – although not necessarily the repeated sign-off "Heil Hitler!", as *The Imitation Game* implies with full dramatic licence.

Turing and Ventris never met, nor were they aware of each other's achievements in codebreaking and deciphering. Bletchley's secrets, including Turing's role, remained classified long after the founding of the A. M. Turing Award in 1966. Equally, Turing showed no interest in script decipherment, notwithstanding the worldwide publicity for Ventris and Linear B after 1952.

Turing was a specialist, dedicated to mathematics and its applications from his teenage years, as the displays of his school report and pre-war papers on computing show. Ventris, on the other hand, did not shine academically and never went to university. But he had a considerably wider range of knowledge than Turing, not only in ancient and modern European languages, but also in architecture, art and archaeology.

"They were intellectually unconventional, personally modest and unusually willing to collaborate"

What the two men shared, however, was intellectual unconventionality, personal modesty, an unusual willingness to collaborate with others – and general agreement among their peers about their respective status as geniuses.

Genius was surely at work in Ventris's guess about the Cretan place names. In that letter to the Oxford scholar, he admits that "This is one of those guesses it's best to keep up one's sleeve, because there's an extremely good chance of it being completely wrong."

The wide-ranging catalogue of this exhibition complements engaging interactive displays of wartime codes and Linear B inscriptions, designed to appeal to all ages. It contains 10 contributions by experts in Linear B, the history of cryptography and current methods of encryption, including Turing Award winner Tony Hoare at Microsoft Research.

And, in the epilogue, there is a tribute to Turing and Ventris by Cambridge philologist James Clackson. He says that in the popular imagination both men have become for the 20th century what Jean-François Champollion, the decipherer of Egyptian hieroglyphs, was for the 19th .

But Ventris's achievement exceeds that of Champollion, who had the invaluable assistance of the Rosetta Stone, that world-famous chunk of dark grey granite-like stone which provided the key to deciphering ancient Egyptian writing. It was the first Ancient Egyptian/Greek bilingual text to be analysed in modern times, generating great public interest because of its potential to decipher an untranslated hieroglyphic language.

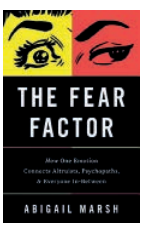
As Ventris noted in 1951 in one of the 20 work notes he circulated to would-be decipherers (the last of which is in the exhibition): "To wait for a bilingual to help us solve our problem is to cry for the moon." ■

Andrew Robinson has written biographies of Jean-François Champollion (*Cracking the Egyptian Code*) and Michael Ventris (*The Man Who Deciphered Linear B*)

A place for good and evil?

What makes you a psychopath or an extreme altruist? **Clare Wilson** explores

The Fear Factor: How one emotion connects altruists, psychopaths, and everyone in-between by Abigail Marsh, Basic Books



THE clearest case of a budding psychopath that Abigail Marsh ever met was 12-year-old button-nosed Jamie. He stole, set fires, and ran a profitable loan shark operation from his bedroom; when his schoolmates ran late with payments, he threatened to shoot fireworks at them.

Then there was 14-year-old Amber, who killed her pet guinea pig, shoplifted designer goods and threatened to burn down the house as her family slept.

Marsh has scanned the brains of dozens of such children in a bid to understand what makes them tick. The most striking finding is that they have smaller and less active right amygdalas, a brain structure thought to let us feel fear and see it in others, as she recounts in *The Fear Factor*.

The fact that psychopaths fail to empathise with others' terror is old news. Before brain scanners were common, that could be shown just by asking them to identify pictures of fearful faces, a task they struggle with. Marsh quotes a psychopath in an English prison sitting such a test for a colleague: "I don't know what that expression is called – but I know that's what people look like right before I stab them."

The twist Marsh adds is to link this finding with her work on a very different group of people: extreme altruists, who go to extraordinary lengths to help others. The most obvious examples are people who save others from burning buildings or freezing rivers. As a teenager, Marsh herself experienced such a rescue after a car accident late at night, an experience that helped motivate her research career.

Heroes are thin on the ground, though, so instead Marsh studied another kind of altruist: people who donate a kidney to a stranger. Many of us might consider giving a kidney to a relative, if we are healthy, but those who turn up at their nearest transplant hospital to offer their spare kidney to whoever is at the top of the list are a rarer breed. Marsh has found that this group has the opposite suite of traits to psychopaths: their right amygdalas are bigger and more active than most people's, and they are particularly good at recognising fearful faces, voices and body language.

You can probably see where this is going. Marsh's big idea is that humans vary in how kind they are to others, with psychopaths at one end of the spectrum, and extreme altruists at the other. And the key biological determinant of where you sit is your right amygdala, via how much it pains you to see or imagine others in distress.

It is a persuasive idea and one that Marsh provides some supporting evidence for, although it seems a little too simplistic. It would have been nice to hear from her about the caveat that brain scanning studies may reveal correlation, not causation. In other words, perhaps the root cause of psychopathy is the malfunctioning of some other more complex and dispersed neural network, or perhaps even that some people have underactive amygdalas because they underuse them.

"Your place on the spectrum is shown via how much it pains you to see or imagine others in distress"

Some of her other theories also seem speculative, such as when she argues that we tend to help people with fearful faces because the expression makes them look more babyish. Then there is her idea that the evolution of lactation in mammals is a prerequisite for intensive maternal care. Where does that leave the impressive parenting skills of non-lactating Emperor penguins, Nile crocodiles and even some octopuses?

Still, *The Fear Factor* is a fascinating tour of altruism research, all the better for being sprinkled with anecdotes about Marsh's life, career and unforgettable research subjects. As well as the extremes of human nature, Marsh says plenty that is of relevance to those of us in the middle of the bell curve, including how we can strive to be more altruistic in our everyday lives. ■

PLAINPICTURE/THE GLINT

Psychopaths score badly when asked to identify fearful faces