To what extent was Alan Turing personally responsible for the cracking of the Enigma codes during World War 2?”

Word Count: 2,200

Identification and evaluation of sources:

This study will investigate the question: "To what extent was Alan Turing personally responsible for the cracking of the Enigma codes during World War 2?"

The first source selected for analysis is the biography: "Alan Turing: the Enigma" by Andrew Hodges. First published in 1983, it was the first major account of Turing's life and has significantly contributed to the modern public understanding of the man not least through its dramatization in the 2014 Oscar winning film "The Imitation Game"[1].

As a biography, the purpose of this source is to provide a comprehensive account of Alan Turing's life. It is valuable for investigation because it can provide detailed insight into Turing's specific role and contribution to the code breaking effort based on official documents, reports and letters. In addition, as a Professor of Mathematics the author is able to bring a scientific rigour to the text that is vital to understanding the importance of the subject's work. Nonetheless, this also presents a limitation: as a mathematician, there is a risk that the author will not show the same objectivity as a historian and will instead choose to glorify the man based on his contributions to mathematics. In his review of the book, Jose Solis describes the book as a "love song to someone who is a personal hero"[2]. This is compounded further by the author's involvement in the gay liberation movement that may have influenced his depiction of the man for political purposes especially considering the context for homosexuals in the UK at the time of publication[3]. Finally, the use of a biography to understand a particular historical period is limited because it has a tendency to focus on their involvement often at the expense of others.

The second source I have selected is a transcript of a talk given on code breaking and its applications during WW2 at the University of Cambridge Computer Laboratory in 1993[4]. This source is particularly relevant because it is a first-hand account of code breaking efforts as experienced by the speaker, Harry Hinsley, who worked as a cryptanalyst at Bletchley Park between 1939 and 1946 and later became the official British Intelligence historian for WW2. As a historian Hinsley can provide valuable insight into the events that he personally experienced when "in close touch with Turing". Nevertheless, the source is limited in that as someone who experienced the events he is less likely to be objective and as the official historian for the British code breaking effort he might over-exaggerate the importance of British contributions or be biased based on his relationships and experiences with certain figures. We must also consider that he is not a "mathematical or technical expert" and therefore his knowledge on the more technical side of code breaking will be limited. Finally, the talk took place in 1993 when Hinsley was 75 years old, some 48 years after the end of the war; therefore his memories and opinions will have been distorted by hindsight and the passing of time.

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[1] http://www.imdb.com/title/tt2084970/

[2] Solis, J (2015, June 8) The Enigma' Is Surprisingly Spiritual in Its Epiphanies. Retrieved from: http://www.popmatters.com/review/193766-alan-turing-the-enigma/

[3] The 1980s saw significant campaigning for gay rights in the UK, same sex activities were only legalised in the whole of the UK in 1982, one year before the publication of this book. The book effectively turned Turing into a gay icon and he came to epitomise the terrible treatment of homosexuals by the British government.

[4] Hinsley, H (1993, October 19) The Influence of ULTRA in the Second World War. Retrieved from: http://www.cix.co.uk/~klockstone/hinsley.htm

Investigation:

In 1939 Alan Turing, a 27-year-old mathematician from Oxford was called to Bletchley Park where he would spend the next 6 years of the war tirelessly breaking enemy codes. Chief amongst these was the Enigma code, notoriously difficult to crack; it was used by the Axis forces for everything except tactical communications. Breaking Enigma would provide the British with invaluable insight into German operations, allowing them to predict enemy U-boat movements that were the scourge of the British Navy. Turing's work at Bletchley has been credited by some historians as having shortened the war by between 2 and 4 years[5] whilst others claim Churchill said: "Turing made the single biggest contribution to the war effort"[6]. Such bold claims have effectively made Turing the hero of the code breaking movement whilst at the same time turning him into a gay icon. More revisionist historians have suggested that Turing's importance has been greatly overstated and that there were others equally deserving of praise working to crack Enigma. I will argue that whilst Turing's contributions were indeed consequential, he was simply one amongst many invaluable cogs which made up the code breaking machine.

Indeed, Alan Turning's revolutionary development of the Bombe machine was essential for breaking Enigma. The complexity of Enigma arose from the constantly changing rotor setup which would be re-arranged by the code sender at the beginning of each day therefore rendering all code breaking efforts prior completely useless. To counter this Turing helped develop a system "of breaking the code that was more general and could break the code regardless of how the system was changed"[7] known as the "Bombe" which could rapidly work out the setup of Enigma machines for the day and therefore decode all messages for that day. His first prototype was completed in 1940 and known as "Victory", it would herald in a new age of computer development. The Allies were now able to break intercepted codes at a much faster rate with some estimates suggesting up to 84 000 messages were being decoded each month, which is around two messages a minute. In the words of Jack Copeland, Professor of Philosophy at the University of Canterbury, New Zealand, Bletchley Park became a true "code breaking factory". Hodges states, "The Turing machine idea owed nothing to the mathematical Tripos, and likewise his cryptanalytic ideas stormed ahead without the benefit of books or papers to build upon, for there were none. In the British amateur tradition, he took out his pencil-box, sat down in his hut and set to work[8]".

In actual fact, Hodges' assertions are wholly untrue. The idea of using an electrical machine to perform complex calculations was not an idea specific to the Bletchley code breakers. A precedent for using machines to perform complex calculations known as the "differential analyser" had already been set by the American Vannevar Bush as early as 1930 and something "similar had been built by the British physicist D.R. Hartree out of Meccano". Hinsley also stated, "The Bombe developed in Bletchley by Turing and Welchman and Babbage […] was helped a little by the Polish machine, but it was infinitely more powerful". In reality, the Poles provided more than a little help: at the outbreak of the war Polish cryptologists including Marian Rejewski handed over their work to the French and British who discovered that the Polish had been successfully spying on the Germans for the last 7

[5] Imperial war museum: How Alan Turing Cracked The Enigma Code. Retrieved from: http://www.iwm.org.uk/history/how-alan-turing-cracked-the-enigma-code
[6] Ibid.
[7] Hodges, A. (1983). Alan Turing: The Enigma. London: Vintage, 222
[8] Hodges, op.cit. 258

years and were “years ahead of the British”. The Poles had obtained a copy of the Enigma machine after one was mistakenly sent to them by the German Embassy, and were able to exploit it thanks to the machine’s instructions being obtained in 1932 by the French agent Hans-Thilo Schmidt[9]. By November 1938, they had already built six “Bombes” to decode Enigma. This information was priceless to the British who had never thought of “the possibility of high speed machine testing against the Enigma before the July 1939 meeting”. Thus, Alan Turing had a significant body of work to build upon in his development of the Turing machine.

Yet according to Andrew Hodges these developments were “not the product of a single brain”, rather two people were primarily involved with its design “Alan and Gordon Welchman were involved in devising the British bombe”[10]. Indeed, Hugh Seebag-Montefiore agrees that Gordon Welchman “explained to Turing how the Bombe could be adapted so that it was at least twice as powerful as Turing’s prototype.”[11]

The reason for Turing’s celebrity is found in his specialisation in Naval Enigma encryptions. Indeed, whilst “Welchman took over the army and air force Enigma systems” and “Dilly Knox took the Italian Enigma” , “the sea war would become Alan’s particular province”[12]. This was a crucial role because nowhere was code breaking more important than in the naval theatre. Here German submarines or “U-boats” were sinking huge numbers of supply convoys headed for Britain and were causing such disruption to the war effort that Churchill reportedly stated, “the only thing that ever really frightened me during the war was U-boat peril”. Once the codes were cracked it would be possible for the Allies to know U-boat movements and therefore avoid them, relieving huge pressure on Britain’s supply chains. Yet even in this endeavour Turing was not alone. Whilst “Alan had begun his investigation of the naval Enigma messages on his own, he was then joined by Peter Twinn and Kendrick and later Joan Clarke”[13]. It was very much a joint effort and it could be argued his position of leadership within the team was because he was one of “the men who went first. He just happened to be in at the beginning”[14].

Finally, the knowledge required to break Enigma could not be purely acquired through the mathematical genius of the combined Bletchley code breakers, let alone a single man. In the words of Hugh Seebag-Montefiore, “the code breaker boffins at Bletchley Park,[...] , just could not break Germany’s Naval Enigma code using brainpower alone”[15]. This was because the code breaking operations relied on knowledge of the inner workings of the Enigma machine that were constantly being changed and improved throughout the war. Hinsley says, “We needed in addition to this superb mathematics, [...] we also needed these side assets – essentially captured material.” To this effect, various secret operations were set up to retrieve information on the Enigma machines from German ships and U-boats such as Ian Fleming’s operation Ruthless.[16] A huge victory came in the forced surfacing of the U-boat U-33 in the Firth of Clyde, which allowed the British to capture three

[9] Sebag-Montefiore, H (2000). Enigma: The battle for the code. London: Phoenix, 20
[10] Hodges, 226
[11] Sebag-Montefiore, 64
[12] Hodges, 235
[13] Hodges, 245
[14] Hodges, 257
[15] Sebag-Montefiore, 13
[16] Fleming, I (1940, October) Operation Ruthless, Retrieved from: http://www.turing.org.uk/sources/ruthless.html

rotors from the Enigma machine crucial to the breaking of the code. This would be followed by a further 14 captures of Enigma related material such as codebooks or rotors over the course of the war. In this regard "Cryptanalytic work only gained meaning through a coordination of many different kinds of activity, of which puzzle solving, though critical, was but one"[17].

Thus, we have seen that whilst Alan Turing's work was indeed invaluable to the code breaking effort, he was only successful because he was part of a much larger effort both within Bletchley Park and the wider intelligence community. In the case of Alan Turing, the irony of a gay man helping to defeat a regime notoriously oppressive to homosexuals coupled with the ensuing tragedy of his prosecution by the British government has made his story stand out from the crowd yet it is important not to let it obscure the hard work of the thousands of others working at Bletchley and the bravery and sacrifice of the operatives who gave their lives trying to retrieve Enigma information[18].

Reflection:

One issue raised by this study is the tendency to focus on the role of a single individual in history at the expense of others. In the case of "Alan Turing: the Enigma", although we are made well aware of the fact that Alan is working as part of a greater group, the fact that our perception of the Bletchley Code breakers is framed through his biography makes him seem like the catalyst around which everything happened. A biography is biased as a vessel for teaching history since it will invariably tell the story through the oft tainted lens of that person's perception of events. To counter this, in my study I tried to use sources from different figures and perspectives: one which showed events from the perspective of Alan Turing, one from the first-hand account of Harry Hinsley and another based on the work of other intelligence operatives by Hugh Seebag-Montefiore. By crosschecking between different perspectives, we get a much more rounded view of events.

The second issue is our tendency to choose a good story over hard facts. This raises the issue over whether or not it is the responsibility of the historian to make sure that history is told accurately or whether it is possible to take creative liberties. Whilst the film "The Imitation Game" was based on Andrew Hodges book it still chose to incorrectly suggest Turing committed treason for dramatic purposes. Even in books one could argue that considering historians have to make do with limited sources they inevitably have to fill in the gaps and therefore we are always faced with some uncertainty when interpreting historical events. In the case of this study it was possible to use the extensive referencing of each book to corroborate facts however this prove to be much more challenging for the talk by Hinsley which was based on his own personal experience.

The final issue raised by this study is how historians can truly judge the importance of a specific factor or event. One way is by using counterfactual history in which one looks at whether events would have played out differently had a certain factor not been present. In this case one could ask whether Enigma would have still been cracked had Alan Turing not been present. The issue with this is that we enter the domain of speculation which is dangerous because we can never truly take into account all the possibilities or variables. Instead I chose to show how each part of the code breaking process was interconnected and equally important without ever speculating on different outcomes.

[17] Hodges, 275
[18] Sebag-Montefiore, 11

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