

CRYPTOLOGY IN NEAL STEPHENSON'S *CRYPTONOMICON*

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Abstract

Science fiction emerged as a modern genre in the West during the twentieth century. This genre connects two worlds together, the world of literature and the world of science; it also deals with the consequences of scientific and technological advancements. Neal Stephenson is an American writer. His writing mostly focuses on technological enhancements and its role in society. He also explains the imaginary technological growth in detail through his novels. Technology has become a central part in the life of human beings. Human beings and technology are blended together and it looks impossible to remove technology from the life of human beings. The technology is very much developed in the current period while comparing with the period during the Second World War. Hacking and code breaking systems were there during the mid-twentieth century. In the modern period it has grown in many angles. This development of crypto culture is due to the involvement of human beings with technology. In this novel *Cryptonomicon*, technology occupies a key role in the military innovations like airplanes, missiles, space crafts, tanks, drones, satellites, computers, GPS and so on. It assists to improvise the technological operations throughout ages. In *Cryptonomicon*, Mathematics is used as a base for cryptography. The characters extend their mental self through cryptography by applying mathematics. The cryptology during the World War II serves as a base for modern cryptography to encode and decode messages. Thus human beings became cyborgs when they started to use technology like cryptology in their communication.

Keywords: Cryptography, cryptology and cyborg, hacking and code breaking system, human sense, scientific and technological advancement.

Neal Stephenson is an American speculative and historical fiction writer. This genre of fiction has certain elements that do not match with the real world. The settings contain supernatural, futuristic and other imaginative elements. The

plot is located in the past and portrays the social condition of the situations. Stephenson throws new light to analyze the transformation of human beings mentally and physically due to digital technological enhancement. The novel *Cryptonomicon* highlights the characters in two different periods, as one group belongs to World War II era and the other group belongs to late 1990s.

Cryptonomicon explains the code breaking, illegal money transfer and postwar technological development. This novel focuses on the pre-technological and post-technological development in the communication sector. It belongs to the genre of both historical fiction and techno thriller. The story line runs through two different periods. The first story line runs during the Second World War period and the second story line takes place during the 1990s, when the internet flourishes and reaches its peak. This novel depicts highly technical and detailed descriptions of information security and modern cryptography along with analysis of prime numbers, modular arithmetic and Van Eck Phreaking. In modular arithmetic the values are reset to zero and start to increase again to reach a predefined value. It is used in cryptography and computer science. Van Eck Phreaking is a kind of caves dropping with special equipment from an electronic device. The main purpose of Van Eck Phreaking is to spy on electronic devices. This novel *Cryptonomicon* is described as the Bible of the cryptographers, Cryptology is the intersection of other disciplines like computer science, electrical engineering, physics, communication science and mathematics. It is a part of Cryptography.

Cryptology encompasses cryptography and cryptanalysis process. All these are interlinked in coding and decoding. Cryptography helps in secure communication with the techniques by constructing certain protocols to prevent third parties from sending private messages. In this novel, many characters are from the 1990s descendants of World War II. The story starts during 1941 in Shanghai. It has fragments of action joined together by the characters. The story takes place during the Second World War and describes allied code breakers. The second story runs through the group of technological magnates, who plan to build a data haven without government's interference. The way characters reappear and interact forms the novel's charm. Lawrence Pritchard Waterhouse is a genius American mathematician and cryptographer, working as a navy officer in the United States. He is asked to assign the newly formed British and American Detachment 2702. The secret mission of this unit is to hide all the proof of breaking the German Enigma code in the military communications by the German military.

Lawrence Pritchard Waterhouse meets Alan Turing and Rudolf Von Hacklheber. Alan Turing is a cryptographer, computer scientist and friend of Lawrence Waterhouse. Alan Turing works with Lawrence and after returning to

England, he used to write letters to him. From his letters it is understood that he could not say anything to other regarding his job due to government secrecy. Lawrence's physical condition and lack of coordination make him join up cryptography school. Due to his mathematical skill, he turns into a leading code-breaker. He has given a great contribution in the navy's compilation of code-breaking procedures known as 'Cryptonomicon'.

Randy Waterhouse, eldest grandson of Lawrence Waterhouse, is an expert in systems and network administration. He meets Avi, his business partner in Manilla in order to discuss their new business of setting up a data haven known as 'The Crypt'. In the past, both Randy and Avi have had many failures in business. Avi believes that it happens because of the interference of the government. They start Epiphyte Corporation, where the office has been set in an intramural way. Douglas MacArthur Shaftoe, son of Bobby Shaftoe, helps to lay underwater cable for Randy's business along with his daughter Amy,

The development in technology like cryptography makes a huge difference in communication system. World War II is the initial stage in the development of cryptography. It becomes contrast in 1990s, which is the period of internet boom, where people all over the world start to communicate through internet. Hacking culture has stepped into the digitalized world during this period. Collecting information from third party without the knowledge of first party through internet begins during this era. This advancement in cryptography and its impact on the society is analyzed through the Actor Network Theory.

This helps people to understand the technological difference in both the periods of the World War II and 1990s. The protagonist of the novel is Randy Waterhouse. The network is cryptography. Randy's Friend Avi, Amy and Doug Shaftoe and Amy's father helped Randy in identifying the treasure and cracking its code. In the modern period, the data are encrypted and decrypted using mathematical algorithms and secret keys. Through Actor Network theory, the digitalized communication system, where the messages are encrypted and decrypted and its impact on the society are explored.

A message with hidden information is called as encrypted message. The receiving message is called decrypted message. Stephenson has brought out both the Second World War and the crypto system. The enhancement in cryptography results in safer communication and also sometimes results in data breach. Randy Waterhouse joined with Avi, his companion in old role playing game, in a new startup business. His startup includes providing non-real time video messages and created data haven called 'The Crypt'. Randy and Amy, his business partner came

to known about the treasure which was hidden under the ocean during World War II while doing a survey for their cable world.

Randy and his partners plan to create digital currency which is baked by gold bars. The treasure was identified and taken by Randy and his partners by decrypting the code Arethusa. Randy decided to spend his part of money in holocaust education for children. Avi and Randy, the characters of 1990s, are found with their laptops, seeking for the information about the treasure. They both walk out of Randy's house. Randy Climbs upon the roof of his car along with his laptop. He has a very good laptop with a twelve volt adapter. His laptop has installed software which could identify every packet passing his laptop. A packet is a tiny portion of bigger message. When a message or data is sent, initially it will be divided into packets and it will be recombined in the receiving device. Randy talks about the diameter of the earth and the height of the radio tower. His radio adapter manages to connect with the pocket radio network.

John Cantrell and Tom utilized cryptography, the network, to decrypt the message in order to identify the treasure. Though Randy was arrested for false charges, he has broken the code for the treasure and sent it to his friends. Though he has the intention of earning more money, he has the soft corner for the people which results in spending his gold treasure for free education of children affected in holocaust. The technology is getting advanced like advanced cryptography which results in shaping the society by producing a secured method of communication.

Cryptography in the military sector helps protect their own country by corrupting or destroying the enemy's secret information. Unlike physical attacks in the ancient wars, the present military takes information attacks in hand to defeat the opponent. The wars during the ancient period centered upon the organization whereas the modern wars center on technology. At present, due to technological enhancement, cyber warfare becomes very common instead of the ancient style of war. Ancient wars were physical attacks, bombs and fire fight. Cyber war uses digital attacks on a country to damage the information networks by cyber weapons like viruses, phishing, computer worms, malware and hacktivism. These cyber weapons become viable of the war.

Viruses are the codes that infect the core files or applications in the system. It can spread from one system to the other. Phishing is the deceitful practice of tricking a person to reveal his personal details. They will mislead a person by sending emails declaring that they belong to a reputed company. Computer worm is like a malware that spreads and replicates itself independently from computer to computer. Malware is a software written intentionally to attack a computer network, server or to gain access to information or system. Hacktivism is breaking the codes

of a system or application illegally using computer codes and techniques. The hacker can hack into a system and steal the data, which is called data theft. They can make use of the data or destroy the data permanently. Cyber war harms or disrupts the actual war or computer systems.

The characters in this novel are very much fascinated in mathematics and they use it to achieve their goals. Lawrence Waterhouse's love for mathematics plays a major role in his career. His interest in mathematics helps his teacher in fixing church organ. "Lawrence, who helped him open up the hood of the thing" (7). Later he shows much interest in learning tricks of using numbers. During his studies in Princeton University, he had friendship with Alan Turning and Rudy Von Hacklheber. They used to discuss the way of using mathematics to build computers and code machines. His knowledge in Mathematics makes him an expert in cryptology. Randy Waterhouse is also very much interested in mathematics like his grandfather. He depends upon mathematics while hacking computers. When Randy and Enoch Root are in prison, they communicate through numbers secretly. In this novel, mathematics is used by the allied powers for code breaking and also to rediscover the hidden treasure.

Randy explains to Amy about his interest in cryptology. He doubts that it can be passed through genes from his ancestors. He does not know anything about his grandfather's knowledge on cryptology. He simply knows that he is a war souvenir by looking into a trunk of crypto materials. It is pictured as "I guess I have crypto on the brain. And, if there was some kind of connection between Von Hackheber and my grandfather" (60). Randy identifies the code of treasure which is dumped in the sea water near Philippines. He decrypts the code and opens the golden treasure. He has utilized his share for providing free holocaust education. His passion towards Mathematics enriched his knowledge. His nature of being kind made him to act with humanitarian concern by providing free education for children affected by holocaust.

The technology and the life of human beings in the present period entwined. The technological development in the field of virtual reality makes certain changes in the society. It has become a necessity in every aspect of human life. People started to depend on technological devices, tools and concept in everyday life. They began to extend their physical and mental abilities through technological devices. This results in transforming human beings into cyborgs. The digital technologies and digital data assist to perform the routine activities or business in better way. Through digitalization a work can be done or a message can be conveyed at lightning speed. Digital innovation should reshape society in a healthy way. In this

novel Stephenson digitalized communication and money transfer through cryptology.

Stephenson has explained complex mathematical and scientific concepts in a descriptive way. He has moulded these concepts in a way that fits into the narration. The third person of narration makes the reader come across various characters and analyses their opinion. The plot is highly commendable which provides proper information on places and events. The novel has the detailed descriptions of ciphers and codes of Allied Code Breakers during the Second World War. Stephenson also brings out the modern cryptography and data security in the second part of the novel. This shows the art of progression in cryptography. Code breaking during the Second World War was unaware to the public. The ciphers were decoded in secret. This was known only to a few technical operatives. He says “any information system of sufficient complexity will inevitably become infected with viruses, it generated from within himself” (118).

Stephenson portrays the characters according to the present era. Through the narration, he used various elements of magical realism and science fiction to draw an intrinsic narration on codes and code-breaking. After the arrival of internet and virtual world, people started to live virtual world more than real world. The mental state of a person is intertwined with second world called virtual world. People believe that that they have escaped from the clutches of reality and entered into virtual world to be free without any control or rules. It proves technology and human beings are inseparable.

The interference of technology in society results in changes like lack of friendliness among people, abundant animosity. On the whole, this paper attempts to assure mankind that technology has become a part of human life. Digitalization can be done in technologies and data without affecting the bond among people. People should have some basic qualities of humanity, kindness, compassion, selflessness and patience. When technology is introduced it has its own impact on culture and society but before introducing it, proper analyses should be done on it and proper guidelines have to be given for its safe usage and disposal. Thus the changes in culture and society are appreciated when it does not harm people and the environment. Hence a judicious use of science and technology in this digital world, results in a harmonious existence of man in the society.

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