

Chapter II

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Cultural Shift: A Culture of Science and Technology

The cyborg anthropologists study the development of science and technology as a cultural activity. Culture is the way of living life where certain habits or rituals or customs or beliefs are shared by the people of a group. Culture transmits patterns of life from time to time. Change is constant and inevitable. Changes occur everywhere similar to the change in weather, politics, human mind, emotion, preferences, technology, customs, culture and so on. The change in culture occurs due to establishing a new contact with an individual or a particular cultural group during war, trade, tourism and immigration. The cross-cultural interaction results in adopting new elements of the other culture. Technology plays an important role in cross-cultural interaction across boundaries. This results in adopting and changing certain elements of the culture in a particular group rapidly.

The new technological innovations in the fields like communication, transportation, goods production, education, medical and so on end with the outcome of certain changes in culture. This can also lead to a change in the culture by changing the habits and way of living. The culture gets adapted to the advancement in technology and changes accordingly. For example, the education system in India can be considered. Initially, in the ancient period, education was provided in gurukula, where the students had to go to the teacher's place and stay there for a few years and learn. It is the traditional way of education. After the Britisher's colonization in India, the gurukula system has been changed slowly into classroom education, where the students can commute from their home every day.

This system is adopted from the western culture. At present, classroom learning is getting replaced by online self-paced learning according to the new education policy. The technology paves way for easy learning. The culture is influenced by the new technological developments and its advancements. There are many changes in each stage of cultural development. A new culture is constructed every time when the elements of the culture like values, beliefs, language, art, customs and tradition are replaced. Science and technology can be used as a tool for cross-cultural interaction.

This chapter deals with the first objective of cyborg anthropology, which is the role of science and technology as a cultural phenomenon. Cultural materialism is used to analyse the changes occurred in culture due to changes in the materials used in day-to-day life. After the emergence of science and technology in daily life, human behavior and society get changed. In order to spot the reason for the cultural change, the history is traced. The behavior and utilization of the materials in society in the past is compared with the present scenario mentioned in the select novels. To analyse one of the aspects of cyborg anthropology, this chapter focuses on cultural materialism from the anthropological perspective; three levels of cultural materialism; gist of the select novels and their application.

Cultural materialism is introduced by Marvin Harris in his book *The Rise of Anthropological Theories* in 1968. It explores cultural changes due to materialistic intervention in anthropological perspective. It incorporates materialistic ideas from Marxism, cultural evolution and cultural ecology. The change in human behavior due to materialism is explained as “the physical world impacts and sets constraints on human behavior” (Margolis 148). It explains the similarities and differences in culture within a

societal framework. This consists of three levels: infrastructure, structure and super structure. Infrastructure is the basic and it consists of material realities like technology, economy and demographic factors which influence structure and super structure. Structure refers to the economic, social and political aspect of a society, whereas super structure consists of ideology and symbolism.

All the three levels of cultural materialism are interrelated. The changes in infrastructure like technology and other practices used for expanding or limiting the basic resources like food, shelter and clothing result in influencing both structure and super structure. Catherine Buzney and Jon Marcoux rightly pointed out that “technological and economic aspects play the primary role in shaping the society” (Buzney 1). Technological, economic and demographic factors of infrastructure mold the structure and super structure of the society since they are interdependent. Unlike Marxism, cultural materialism has no class theory. Cultural materialism insists that the culture of a society changes due to the innovations that change the materials used in a society.

The summary of the first novel taken for the study is discussed. *Zodiac* is an eco-thriller novel, which picturizes the pollution in Boston harbor through the protagonist Sangamon Taylor. He has been motivated by the works done by the environmental chemist Marco Kaltofen, who has investigated toxic, petroleum, chemical and radioactive wastes. Taylor works as a chemist in the fictional environmental activism group named GEE. This group gets into a protest by plugging up the contaminated waste pipes directly from the harbor. Taylor is very much interested in doing such jobs to save nature. During his project, he comes to know about Basco industries, the major producer of Agent Orange, a herbicide. The chemical components in Agent Orange make it hazardous and

the toxic substances remain for decades in the living environment and cause cancer; birth defects; and nervous, respiratory and circulatory problems. It also reminds him that the soldiers and people in the Vietnam War are affected by these serious health issues.

Basco industries have dumped all the wastes directly into the harbor without checking their permitted pH level, where pH stands for potential of hydrogen, whereas H is the chemical symbol for hydrogen. pH is a scale used to measure the value of water. During the project, Taylor has collected the samples of lobsters and fish. He found out the concentration of polychlorinated biphenyls (PCBs) in the harbor water with the help of a fisherman's family. Initially he has identified the presence of PCB in the harbor later he has noticed a sudden disappearance of PCBs from the water.

Taylor comes to know that Basco industry has acquired a bio engineering company, which produces toxic eating bugs to clean the water of harbor instantly. These microbes can eat the toxins from the water and in return it can also produce toxins. The company releases the bugs without carrying out the full research in order to escape from the clutches of law. Taylor along with his colleagues and friends has taken serious efforts to bring this eco crime to limelight. The Basco industry framed Taylor as a terrorist by planting bombs in his house in order to divert the attention of the government. Taylor escapes from the place and later he captures a container ship of Basco which contains a large amount of toxins that are to be dumped in the harbor. This is telecasted through the media and the government puts a ban on the company. The application part of this novel

explains the role of science and technology as a cultural phenomenon. Through the concepts of cultural materialism, the cultural changes due to technological interruption in Boston harbor are explored.

The application part explores the cultural shift in *Zodiac* through the three levels of cultural materialism: infrastructure, structure and superstructure. In *Zodiac*, water pollution in Boston is the central problem. The ecology of the Boston harbor is considered as the infrastructure. Thus the history of Boston harbor is traced out to find out the changes in the ecological factors. *Zodiac* explains water pollution in Boston harbor and its effects in detail. This novel sets up a way to analyze the cultural change in Boston before and after the industrialization. The Boston harbor is connected with many historical events, culture and science. The novel focuses on Boston harbor and people's life around the harbor during the 1990s. The culture of the people keeps on changing especially after the historical incidents like arrival of the Puritans, American Industrial Revolution, Civil War, Boston water pollution and the Clean Water Act. Before tracing the historical incidents, the geographical structure of the Boston city is discussed. The historical events such as arrival of Puritans and establishment of their settlements through fishing, trading, agriculture; industrialization are revealed. The technology gets developed during each period and it results in changing the elements of culture. The cultural change in the modern period can be traced through cultural materialism. Change in culture is depicted as "a sequence of events that occurs in time and leads to an outcome" (Lyman 237). The changes in basic necessities of life like water and food due to technological practices results in the change of domestic economy and values in human life.

The geographical structure of Boston is discussed. Boston is the most famous city and it is the capital of Massachusetts in the United States. Boston city has the oldest municipalities of the United States. It is found by the puritan settlers of England. The history of Boston begins long before the arrival of Puritans. Initially large glaciers and ice sheets covered North America. The glaciers started to melt and as a result debris is deposited across the northeastern part including Boston. The glaciers begin to melt and it has been fragmented into small pieces of ice. As a result, formation of the drumlins like Beacon Hill, ridges, kettle ponds, rocks, boulders and some parts of Islands of Boston harbor, shape the Boston landscape. The geographical structure of Boston has been shaped by these glaciers formed during the last ice age.

The history of Boston is discussed. Puritans were the first to spot this landscape. Puritans arrived in Boston during 1630 in eleven ships along with their livestock and possessions. Before they arrived, Native Americans settled in the eastern Massachusetts. Initially the Puritans called the place of settlement as Tremontaine due to three tall peaks. But within a few days they changed the name to Boston, a town in England, from which they came. Later in the 1800s, the increase in population resulted in leveling of two hills namely Copp's Hill and Fort Hill. The waterfront is extended and many houses are converted into luxury apartments, schools, offices and for other uses. At present only one hill remains namely Beacon Hill. Copp's Hill has been cut down to establish the West End. Fort Hill has been leveled to build up the Financial District.

Infrastructure is the first level of cultural materialism. The ecology of the Boston harbor is the infrastructure as the people's economy depended on it. Boston is rich in fishing, trading and agriculture. Boston is known for fishing in ancient days. In the

distant past, water resources remained pure without any pollution but in the present time, pollution affects water resources and causes sickness to the aquatic organisms. Puritans started to utilize the sea for their livelihood. They built ships for their trading and became merchants. Seamen and fishermen utilized technologically advanced boats and ships for their trading and fishing. Boston became a chief place to trade for the merchants. Puritans made use of Boston harbor to move to England, their hometown, freely for trading.

This made Boston a prominent seaport. Many people started to settle in Boston and industries are built in the banks of Boston harbour due to its easy trading. Puritans and Native Americans employed Boston land for agriculture and for grazing cattle and sheep. During summer, the crops are grown by them on the drumlins in the bay, which is called Boston harbor islands. People of Boston incorporate technological ideas in the basic needs like fishing, trading and agriculture which results in cultural change.

Boston became a place of multiculturalism. The ethnic pattern of Boston changed after the World War II. It is because of the settlements of Irish colonists and African-American people. Immigrants from Caribbean islands, Central and South America, China and Vietnam settle in Boston. This makes Boston the land of diverse culture. The new culture has been adapted by the people of Boston with a little influence of technology in it.

During the nineteenth century, shipbuilding concerns and industrial textile mills dominated the economy of Boston. The investments of people in railroads and banking started to increase. This paved way for the additional source of wealth. During World War II, the Universities of Boston provided scientific and technological ideas to the war related industries. Boston had changed from mill based organizations to mind based organizations and later these industries of Boston had gone ahead with software designing,

data processing, computer architecture and biomedical technologies. Industrial growth reached its height due to development in technology during the twentieth century.

This alters the culture of human beings, who started to depend more upon technological advancements.

In *Zodiac*, Stephenson explains the improved boat facilities and change in fishing culture in Boston. The tremendous growth in the industrial sector not only paves way for economic growth but also for the pollution of harbor water. The purity of nature is lost after the upliftment of technology in Boston industries. It is due to the poor handling of technology. The change in material life affects the domestic life of people. Russell W. Belk explains materialism in the life of human beings as “at the highest levels of materialism, such possessions assume a central place in person’s life and are believed to provide the greatest sources of satisfaction and dissatisfaction” (Belk 265). It took many years to remove wastes from the Boston harbor. In 1972, the Clean Water Act was passed to regulate the toxic and pollutant discharges into the water.

Through genetic engineering and other digital equipments in biotechnology lab, the reasons for sickness in aquatic organisms are identified accurately. The Environmental activism group GEE is working on a project called Project Lobster. This project unfurls the illegal activity of the Basco industries that they dump old transformers into the Boston harbor and as a corollary they emit toxins which are dangerous to any living being. Taylor, a major figure of this project, depicts that “Analysis of each sample would show how much bad shit there was, then I’d know how things are distributed” (Stephenson, *Zodiac* 11). Taylor is not sure about the settling of toxic wastes inside the marine organisms. The chemicals can be distributed all over the body and affect

randomly. The chemicals suck the purity of water. In the present scenario it reminds people that it is a dirty harbor. It is said that “There’s a harbor out here. It’s dirty” (Stephenson, *Zodiac* 103). Sometimes it leads to the death of the organisms. Taylor depicts that the mammals are shedding tears due to their suffering. The cultural systems like daily practices and livelihoods get changed due to the interruption of technological advancements and its consequences. French anthropologist Claude Levi Strauss has rightly pointed out that “there existed only two true models of concrete diversity: one on the plane of nature, namely that of the diversity of the species, and the other on the cultural plane provided by the diversity of functions” (Levi 124). There are varieties of species living in the Boston harbor. Their cultural plane of the species gets changed due to change in the natural elements.

The purity of nature has been wiped out due to the unwanted wastes from the industries. Human beings dispose the unwanted products and wastage of industries into Boston harbor. Nature's purity is damaged by technological wastes. The industrial wastes and the human wastes pollute the water resources very badly. The chemical industries would not like to show their fault in front of the public. The chemical industries say that “to make it sound less dangerous” (Stephenson, *Zodiac* 23). Taylor explains the purity and polluted nature of Boston harbor. He utters that the ponds and water sources are highly polluted. The paint companies dump all their toxic wastes into the water resources. These are absorbed by soil and aquatic organisms which make them impure and infertile. He explains the condition of pond in Boston University as:

A college campus that had trees and ponds on it. This is what it looks like, the guy continued, the dirt, the pond everything... the area around the pond was a heavy-metal sewer, and I ain't talking about the rock and roll. Rainbow-colored, a little like water with gasoline floating on it, but this wasn't superficial. The colors went all the way down. They matched the dirt. All the colors were different and - forgive me if I repeat myself on this point – they all caused cancer... I know damn well this wasn't a natural a natural pond... a square mile of poison”

(Stephenson, *Zodiac* 11).

The nature of the pond and its ecosystem gets affected due to the disposal of heavy metals like paint in it. People rarely think of its negative consequences. Instead they started to adapt themselves into this culture which is full of technological advancements. The technological practices limit the dependency of man on nature. The basic necessities of life like water and food are polluted which results in prohibition of aquatic foods in Boston harbor. The food chain gets affected due to water pollution.

Since the infrastructure of Boston Harbor is affected, the structure gets changed. Through *Zodiac*, a fast sailing motor boat, Taylor has done many investigations regarding harbor's pollution. By looking at the over-pollution of the harbor, Taylor utters that:

I had entered the Boston Harbor, the toilet of the Northeast. By shoving the motor over to one side I could spin I could spin the Zode in tight rings and look up into the many shit-greased sphincters of the Fair Lady on the Hill, Hub of the Universe, Cradle of Crap, my hometown. Boston Harbor is my baby. There are

biologists who know more about its fish and geographers who have statistics on its shipping, but I know more about its dark, carcinogenic side than anyone.

(Stephenson, *Zodiac* 31).

Fish and lobsters turned out as slow poisonous edibles for human beings.

Nature begins to alter its course when there is a disturbance or an artificial interruption. The occupation of the fishermen community depends on the ecology of Boston harbor, which gets affected and it also changes the structure of the economy. People of Boston have stopped eating the aquatic organisms. This leads the fishermen family to poverty. Their occupation gets affected and they are pushed into the situation of doing other jobs. The nature of employment gets changed. The technological adaption and lack of its proper usage has a tremendous impact on cultural values. Instead of catching fish and lobsters for consumption, they have been caught for research. The illegal activities have changed the cycle of nature very fast though it takes time to recover it back. The change in basic needs like water and food due to pollution alters the process of the food chain and the livelihood of fishermen family in Boston. The water pollution also results in bringing up new diseases in the aquatic organisms and human beings who consume it. This change in infrastructure and structure resulted in changing the values of life.

After the industrial revolution, industries started to use machines instead of human power. Through technology the diseases are identified and treatment can be given but the initial purity of nature cannot be regained. Though technology helps to identify and cure disease, unfortunately technology is responsible for the cause of those diseases. The wrong implementation of technology and lack of complete knowledge of it are

responsible for the ill health and certain side-effects. Extreme sicknesses of animals cause their death much earlier. The life span is reduced and they are suffering nearly half of their life span due to pollution.

The fishermen are advised not to catch lobsters and fish in the harbor due to sick aquatic organisms. The affected aquatic organisms can cause cancer to human beings of all age groups and also other kinds of skin diseases like skin rashes and allergy. Taylor could not withstand those illegal activities. He wants to identify the reason and bring it to the limelight. So that the pollution can be prevented and proper steps to restore nature can be taken. Taylor expresses this as:

I'm not talking about may be getting cancer in twenty years. I'm talking about croaking next week. Don't eat those lobsters. I want you to go find all the other lobstermen and tell them not to use that area... the oily lobsters. Those things are poison. Especially for kids and pregnant women... I'm going to find them, and then I'm going to blow them away. (Stephenson, *Zodiac* 120, 121)

Taylor, while roaming through the *Zodiac*, notices something is floating on water. When the *Zodiac* moves near it, he identifies that "It was a dead dolphin" (Stephenson, *Zodiac* 62). He further says that the pollution "was killing some more dolphins" (Stephenson, *Zodiac* 75). These lines explain the tragic life of aquatic organisms in Boston Harbour. They were losing their lives because of the presence of some toxic elements in the water. He utters that Boston harbor is the "Harbor of Death" (Stephenson, *Zodiac* 281). Nature's purity has been spoiled by corporate companies for years. It is easier to destroy than to reconstruct. Taylor explains that "Basco and a couple of other

companies had rained toxic waste on his native land for years” (Stephenson, *Zodiac* 46). The steps have been taken to reconstruct nature's purity and it takes many decades to clean up. The blend of culture and technology destroyed nature.

In White Mountain, Taylor adores the beauty of nature. He realizes that he is impure before the eyes of nature. He expresses that “I’m poison. I’m toxic waste at this point” (Stephenson, *Zodiac* 206). In White Mountain there is no pollution. The water resources are fresh and pure. Taylor has stopped eating aquatic organisms due to pollution and sickness of aquatic organisms. He utters that “they ate more of it than I did and they weren’t having any problems... I hadn’t eaten any seafood since this thing had started” (Stephenson, *Zodiac* 216). On the other hand, the purity of White Mountain is mentioned as “Ten minutes ago this fish was swimming through a stream that’s clean enough to drink. And we’re, what a couple of hours away from Boston, is all?” (Stephenson, *Zodiac* 216). He compares both the water of White Mountain and Boston harbor. Unlike White Mountain, Boston is dirty everywhere. The purity of water cannot be regained unless people put their own interest in cleaning the harbor. The same technology can be utilized to bring back nature.

The technology and its advancements are implemented stage by stage, which results in cultural change. The growth of population in Boston leads to industrialization and deforestation. After the industrial revolution, the industries have begun to use machine power and artificial products like paints and pesticides are manufactured. The wastages of these products during the manufacturing process are dumped into harbor water. Inglehart and Wayne rightly point out that “the shift from preindustrial to industrial society wrought profound changes in people’s daily experiences and prevailing worldviews”

(Inglehart 21). The material transformation in the industrial sector to increase production and misusing the technology used in the material transformation resulted in cultural changes. The increase in population pushes human beings to invent technological devices for easy work. This upgradation in technology changes people's way of living. The interruption of technology in culture leads to change in nature's conservation and ecosystem management. The constructive response of human beings to mend the destructive technological process helps to rejuvenate nature.

Taylor explains that people use things with a sense of responsibility only if it belongs to them. They don't care while using things that are open to the public. They like to utilize the public property to the maximum but fail to preserve it. He says that water and air are the most utilized natural resources of human beings and these are the most polluted resources. He further says that "A clean Harbor was in their own best interests" (Stephenson, *Zodiac* 35). The technological development affects the agricultural field too. The chemical pesticide produced by the corporate companies is used for agriculture. It has serious effects on human beings as well as the environment. The technological implementation in agriculture changes the way of cultivation. In the ancient days, people used natural fertilizers for agriculture but when the technology got advanced, people started to use artificial fertilizers. Eventually, people began to adapt with the new technoculture without realizing its negative impact.

The technological development leads to new inventions in the research field. In the novel, *Zodiac*, the toxic chemical substances which are mixed in the harbor water are identified due to the development of research in the science field. The implementation of technological advancements results in transformation of culture. In ancient times,

people worshiped water resources as God. Gradually the culture of worshiping nature diminished and the purity of nature got deteriorated. Thus the change in the structure altered the superstructure. Since people of the industries are not ethically and morally bound, they dumped wastes higher than pH values permitted. As a result the values of the ecology of Boston harbor are lost.

The replacement of new technology in the industrial sector and poor handling of that technology resulted in affecting the livelihood of fishermen family in Boston. The food culture gets changed due to water pollution. The aquatic organisms get affected resulting in serious health issues. The food chain gets cracked. The change in the basic needs of human beings like water and food alters the domestic economy due to technological practices. The livelihood of fishermen was affected and people who consume aquatic food became sick. As a result, ecological and moral values are lost due to change in material life. As Marvin Harris explored, in *Zodiac*, the change in water and food alters the domestic life its economy, moral and ecological values of Boston.

The development and change in the technology lead to the change in the way of living. Once nature has been destroyed and human beings start to undergo physical and mental illness, they want to go back to the stage of the ancient period which was enriched with nature. At the end of destruction, people want to bring back the lost culture of their ancestors. Technology plays a major role in shifting human beings' lives. The positive technological change in the education system, research field and communication sector can be appreciated. The implementation of technology in the lives of human beings results in cultural change. The greatest challenge is not about managing the devices or

software. It is about managing the process of cultural change during technological development. Man and nature are interdependent. If one gets changed then automatically the other gets affected. Both should be balanced.

The ecology, which is the infrastructure of Boston harbor, is changed due to the dumping of industrial wastes. The ecological change occurs due to toxic agents dumped in the Boston harbor. The aquatic organisms like lobster and fish became severely affected with liver diseases. When man consumes them, they affect his health as well. Thus the infrastructure of the fisherman's livelihood changes. His livelihood is affected as he has to stop fishing. The economy of Boston gets affected as the government does not get the flow of revenue from fishery. Thus the structure of the society gets affected due to the altered infrastructure of fishermen's families. The government levied a ban for fishing and swimming at the harbor since the water is unfit for consumption. The superstructure of the Boston harbor is affected as the moral and ecological values are lost. Hence all the activities at the Boston harbor are banned. Thus, the cultural change in Boston harbor is analysed through cultural materialism.

Snow Crash, the second novel chosen for the study differentiates Sumerian culture and the advanced technologized culture. Sumerian culture, which is a geographic one, is the oldest among all the cultures. On the other hand technoculture emerges from utilizing computer networks for multi-purpose activities like business, communication and entertainment. The network communication includes online communities, online multiplayer gaming, social media and mobile apps. The author brings out the similarities and differences of both the ancient Sumerian culture and modern technoculture in the techniques used for information storage systems. The advancements in technology

changes the culture which is followed by the ancient people to store information.

This research attempts to give a brief summary of the novel, followed by its analysis.

It traces the change in Sumerian and contemporary culture by implementing technology in the information storage system. Cultural materialism is applied to explore cultural change.

The brief summary of this novel paves way for a better understanding. Hiro, the protagonist of the novel, delivers pizza to the mafia. He is a very good swordsman in real life and in virtual reality. He is also a hacker, who spends most of his time in Metaverse, a collective virtually shared space in which the individual can appear as an avatar of any form. He becomes friendly with Yours Truly (Y.T.), a skateboard courier girl, during a delayed pizza delivery to mafia. Y.T. delivers pizza to the mafia on his behalf. This paves way for their friendship. They run into a partnership of collecting information about politics and society and sell it to the profit organization CIC, which is merged with the Library of Congress.

Hiro has been given a file named 'snow crash' in the Metaverse by a person called Raven. He says that it is in the form of a narcotic. Hiro's friend Da5id views a bitmap image in that file which causes his computer to crash and he also suffers from brain damage in reality. Hiro has got a database from his ex-girlfriend Juanita Marquez about a research on the virus. The research connects the virus, with ancient Sumerian culture and the Tower of Babel Myth. Hiro has been advised to be careful by Juanita and she vanishes.

Uncle Enzo, the Mafia boss, is impressed by the attitude and hard work of Y.T. He starts to take paternal care on her and provides her freelance jobs. The coincidence of Y.T.'s gatherings and Hiro's investigations find the connection among the neuro-linguistic

virus, Pearly Gates, a religious organization and L. Bob Rife, a media magnet. The research of Juanita explains that the function of brain has been allowed to be programmed by the ancient Sumerian language using an audio stimuli with DNA altering virus. The culture of Sumerians has been structured by the programs called 'me', which is managed by the priests. 'Me' is a decree, which has protocols for religious practices, social institutions, work, culture and technologies. Nam-shub, a counter virus has been created by God Enki. When num-shub has been delivered, it stops the processing of Sumerian language from the brain and paves way to develop other languages. This resembles the myth of Tower of Babel, which explains the reason for people's different languages. The myth reveals that the people who speak single language are united and they decided to build a high tower. God who observes their activities and tower, collapsed their language so that they cannot understand each other.

Rife develops the drug called Snow Crash by collecting Sumerian artifacts in order to make the people to support his new forms of 'me' so that he can take control over them. The physical form of the virus is spread through the infected blood within the church of Reverend Wayne, owner of the religious organization Peary Gates. The digital form of the virus is distributed through computers, so that Rife can take control over the hackers who get affected.

Rife captures Y.T. and brings her to the Raft, a vast collection of boats with refugees of Eurasia, which is a land area that comprises Europe and Asia. Rife wants to keep her as his hostage due to her attachment with Uncle Enzo. Rife is using his yacht, which is at the center of the raft to infect the refugees with viruses and bring them to America. Hiro moves towards the American coast, where the raft has been approaching.

Hiro gets into the raft with the help of the Mafia and recovers Enki's Num-Shub, which Rife has been hiding. Num-Shub is an incantation or chant or speech which has magical powers from Sumerian mythology. Num-Shub has been read out with the help of Juanita so that Rife's control over the raft can be broken. The fight starts between the Mafia and Rife. During the fight, Rife is killed while trying to escape through his private jet. Raven has tried to activate the digital form of the virus. It is neutralized by Hiro through anti-virus. Hiro joins hand with Jaunita again and Y.T. is reunited with her mother.

The application part brings out the information storage system of the ancient Sumerian culture and the modern technoculture. The technological practices in both periods alter the domestic and political life of people. The technology used to record information during ancient Sumerian culture like clay tablet, cuneiform script and number system; and during technoculture digital devices like hard disk drives, floppy disks, compact disks, tapes, DVD players, secure digital cards, solid-state drives, cloud storage and punch cards help to identify the shift in culture. While comparing contemporary culture with the ancient Sumerian culture, the drastic growth in people's life due to the upgradation of technology is identified. Cultural materialism is applied to analyse the materialistic change in the information storage system which results in cultural change.

In this novel, Stephenson has explained both Egypt and Sumerian culture. Both the civilizations are considered to be very old. He explains that Egypt has recorded everything in stone. Their art and architecture remains forever when it is expressed through stone. Sumerians used papyrus for writing. Papyrus is a writing material like paper which is manufactured from papyrus plants. Many of their papyrus written records

become extinct when days roll on. Unlike Egyptians, Sumerian people have used clay instead of stone. Their buildings are made up of clay and their statues are sculptured in gypsum so that it can easily be dissolved in water. Sumerians record their details in clay tablets and are baked or buried in jars. They recorded each and every detail of their period. Their data have survived through time. Stephenson portrays this as:

Egypt was a civilization of stone. They made their art and architecture of stone, so it lasts forever. But you can't write on stone. So they invented papyrus and wrote on that. But papyrus is perishable. So even though their art and architecture have survived, their written records – their data – have largely disappeared... Sumer was a civilization of clay. They made their buildings of it and wrote on it, too. Their statues were of gypsum, which dissolves in water. So the buildings and statues have since fallen apart under the elements. But the clay tablets were either baked or else buried in jars. So all the data of the Sumerians have survived. Egypt left a legacy of art and architecture; Sumer's legacy is its megabytes. (Stephenson, SC 201)

The ancient people used stones and clay to record the incidents of their period. Sumerians recorded their information in clay tablets which are baked and buried in jars. It survived for periods. These are the subsistence technological practices which stay as a base for information storage system. This influences the political and domestic discipline of the Sumerian society.

Sumerians use not only clay to record their life events but they write on everything. They even write the process of constructing a building in clay. They used bricks for construction purposes. Cuneiform method, an earliest writing system like hieroglyphs in Egypt, was used to write on the bricks so that the record can be found even

after the destruction of the building. Stephenson describes as follows: “The Sumerians wrote on everything. When they built a building, they would write in cuneiform on every brick. When the buildings fell down, these bricks would remain, scattered across the desert” (Stephenson, *SC* 201). Geoffrey Sampson states about Sumerian and Egyptian writing systems as “Egyptian hieroglyphs came into existence a little after Sumerian script, and, probably, (were) invented under the influence of the later” (Sampson 78). Sumerian writing system is the earliest writing system, which is purely pictographic and it is technically difficult to identify the language. Initially it is used to record the counts of livestock through pictures and marks. This cuneiform writing system is completely replaced by the current alphabetic writing system.

Sumerians invented the number system called sexagesimal or sexagenary which was later followed by the ancient Babylonians. It is used to measure time, angles, and geographic coordinate system. The numbers are represented in cuneiform symbols, which are used by Sumerian people in their day-to-day life. An Austrian-American mathematician says that “Apart from mathematical tables, the inconsistencies in how numbers were represented within most texts extended all the way down to the most basic cuneiform symbols used to represent numeric quantities” (Neugebauer 17). By researching clay tablets, Otto Neugebauer discovered that the Sumerians and ancient Babylonians mastered mathematics and astronomy. Sumerian writing was very useful for their administrative purposes. The implementation of the number system and alphabets are the initial stage of communication. Papyrus leaves, bricks and clay tablets are the base for storing information like cultivating crops, construction works, fishing and so on. Later

people started to follow those stored instructions in their daily life. The codes and values of the Sumerian culture are preserved due to the technological influence of the information storage system.

In the contemporary period, information are stored in various digital devices like hard disk drives, floppy disks, compact disks, tapes, DVD players, secure digital cards, solid-state drives, cloud storage and punch cards. Stephenson explains the latest development in the information storage system and fastest mode of communication due to technological advancements in *Snow Crash*. The increase in need makes people to depend more on technology. This is explained as “Society is becoming increasingly dependent on the accurate and timely distribution of information. As this dependency increases we become more vulnerable on the technology used to process and distribute information” (Parikka 1). Stephenson also points out the disadvantages of using digital devices for information storage and communication like lack of privacy and data breaching. Practicing technological advancements in the information storage system alters people’s domestic patterns. People not only use technologically enhanced devices and applications to store information but also they dwell in the stimulated artificial environment like virtual reality to escape from the reality.

Lagos, librarian and an information collector in *Snow Crash*, is very keen about collecting information. Like Hiro and Y.T., Lagos also collects information and looks for better gain. He has been researching on Sumerian civilization for many years. Rife, hacks all the information from Lagos and utilizes it for his own welfare. Privacy lacks in the digitalized world. In the current scenario, people can record the event or incident or information very easily. At the same time, the information can be easily misused; hacked;

and sold, which is known as data breach. In the article “Enterprise data breach: causes, challenges, prevention, and future directions” data breach is defined as “the intentional or inadvertent exposure of confidential information to unauthorized parties” (Cheng 1). Data breach has become a serious threat in today’s digitalized world. In *Snow Crash*, Stephenson brings out the hacking culture in the cyber society. It is easy to hack one’s information or system or brain. He depicts data breaching of Da5id’s system as “he sees the image: a wall of black-and-white static. Da5id’s computer has snow-crashed” (Stephenson, *SC* 117). When Da5id opens a virus file in virtual reality, his system got crashed and also he became unconscious and his brain got damaged in reality.

Stephenson explains technological enhancement not only invents new things but also it infects. He says these technological breakdowns as “any information system of sufficient complexity will inevitably become infected with viruses; viruses generated from within itself” (Stephenson, *SC* 118). Technological breakdown or accident becomes very common in the digitalized world. This is explained as:

The history of media and technology is filled with accidents and breakdowns.

The train introduced the train accident, with the boat came boating accident, and inherent in several techniques of data storage, such as papyrus, paper, and film, is the “accident” of the erasure of information. (Parikka 1).

The development in technology paves way for passing information and spreading the culture across boundaries. The culture gets transformed every time when advancement in technology occurs. Though Sumerian language has been destroyed, their records still stand in bricks and clay tablets. People of post cyberpunk use digital devices to record information, which is considered to be easier than Sumerian culture. Though it is easier,

it has risks in keeping the information safe. Both the Sumerian and Post cyberpunk period have stored data in different ways. Sumerian culture provides peaceful life though they have recorded everything manually. There are certain issues in using digital devices like communication breakdown, identity theft, cyber bullying, gaming addiction, privacy and crime. The excessive usage of technological developments results in physical and psychological issues like eye strain, social isolation, limited physical activity, disrupted sleep, depression, low family relationships and anxiety.

In Sumerian culture, the infrastructure, information storage system, is considered to be a subsistence technology. The information on the basic requirements of life and its production like cultivating crops, fishing, construction works and so on are stored through papyrus leaves, bricks and clay tablets. It also contains the rules to be followed by the Sumerian people. Thus in infrastructure, the implementation of information storage system facilitates the maintenance of the structure of the society. The Sumerian people followed the rules laid which resulted in domestic discipline. When there is no change in the domestic life of Sumerian people, the super structure also remains the same. The moral values of the Sumerian society pave the way to maintain the stability of social order. The culture gets changed when there is a change in the infrastructure.

In modern culture, the information storage system has advanced technologies like hard disk drives, compact disks, DVD players, secure digital cards, cloud storage, punch cards and drive storage. The implementation of advanced technologies in infrastructure results in lack of domestic discipline in contemporary society. Thus the structure is affected. People do not want to follow the rules and regulations of society. Instead they

want to escape from reality and frame their own rules and regulations in virtual reality. Storing the information digitally also has certain issues like communication breakdown, identity theft, cyber bullying, gaming addiction, hacking and crime.

The digitalization of technology brought a change in the infrastructure which has made the people to survive as an individual machine. People love to live in the world of augmented and virtual reality rather than the world of reality. Man becomes cyborg as human connectivity is minimized and as he gets attached more with the gadgets. Hence the human relationship which is the structure of the society gets disintegrated. The binding factor of togetherness is lost. Since man becomes an addict to virtual reality, he becomes a victim to the hackers. Rife not only spreads the virus to the devices but to human beings as well. He wants to control man by hacking his brain. Thus this kind of change in structure questions the values of human life at large, thereby affecting the superstructure. As a corollary, the super structure also gets affected due to an imbalance of physical and mental health of the human beings which occurs due to the loss of moral values.

Man loses his human connectivity and becomes a cyborg. Though dealing with the physical plane of the cyborg is a welcoming advantage, the mental plane of the cyborg is a concern as it lacks humanitarian touch. Since everything is digitalized, the expectation from the employer is more. The relaxation time for the employee is insufficient. Hence at times man finds it difficult to cope up with the technoculture. So he thinks that online games are a stress buster but he engages himself only to find himself marooned on an island. Thus the lack of moral values and humanitarian concern is the change found in the super structure. In order to prevent the spread of snow crash, the virus, man needs to depend on technology to resolve this problem.

The Diamond Age is the third novel taken for the analysis of this chapter. This novel has focused on many things like tribal culture, advanced nanotechnology, female infanticide, self-identity and futuristic things. Finkle-McGraw, Lord equity of New Atlantis of this novel, says that some cultures are better than others. It is because some cultures flourish and expand whereas many cultures fail. The expansion of culture leads to its betterment. A culture can move on to its next stage due to certain development or causes in and around the living environment. Technology has occupied a major place in cultural change. This research focuses on a brief summary of the novel and the cultural change after the development of technology is traced through cultural materialism.

The summary of *The Diamond Age* depicts the near future of the world, where nanotechnology has developed and buildings have been produced cheaply. It is a coming-of-age story, focusing on a young thete girl Nell, living with her brother Harvard and mother Tequila at lowland slum called Leased Territories. A thete is a person who does not belong to any tribe. It is considered to be the lowest working class. The buildings on the Leased Territories are built by artificial diamondoid located near the mouth of river Yangtze. This river is also mentioned in Stephenson's another novel *Cryptonomicon* as "A Yangtze River Patrol gunboat is tied up there" (Stephenson, *Cryptonomicon* 1, 2). Nell's name is also traced in Charles Dickevision's work *The Old Curiosity Shop* (1840). The name of the protagonist in the work is Little Nell.

Nell receives an interactive book named Young Lady's Illustrated Primer from her brother Harv who has stolen the book from John Percival Hackworth, who is a nanotech engineer and the code developer of the Primer. It tells the story of Princess Nell, her friends and her effort to collect twelve keys to open the castle where her brother is

imprisoned by her step mother. This Primer is actually developed for Elizabeth Finkle-McGraw, the granddaughter of Lord Alexander Chung-Sik Finkle-McGraw, who is a renowned person in the society.

The three girls Nell, Elizabeth and Hackworth's daughter Fiona have received the Primer. It is developed to respond to the environment of the owner by teaching their needs to develop and survive in the society. The story of the novel moves in three directions. One is the development of Nell through the education from her Primer. The second story line is the weakening of Hackworth's name in the society due to the two illicit copies of the Primer. The third story line depicts the life of Miranda, an actress, who interacts through her voice in Primer with Nell.

The Diamond Age exposes the narrated educational tales from the Primer. There are a few other minor characters in the novel, which adds color to the storyline. This novel explores the role of technology in the development of a successful child and also looks into the values of culture and lack of communication among the people. The enhancement in the field of nanotechnology has an impact in the culture. People started to use the artificial products which are cheap in order to escape from the clutches of poverty.

The application part explores the cultural difference between Victorians and the community in the novel, due to the advancement in the field of nanotechnology. Cultural materialism is applied to trace the materialistic change in culture due to technological intervention. Implementation of nanotechnology among the economically deprived people is the change in the infrastructure. Thus the these people use artificial products changing their domestic structure of life. *The Diamond Age* is a futuristic novel, where nanotechnology makes everything possible even for poor people. The life and culture of

New Atlantis people differ from these people. The people of New Atlantis, who are mostly educated, are considered to be the greater phyle, another tribal community, than others. Most of the engineers belong to this phyle. People who do not belong to any of the tribe like Victorians, Han and Nippon belong to these community. Though the people of New Atlantis have invented many technological devices, they prefer natural products. The houses and streets in New Atlantis are described as:

A number of buildings clustered together around a central green, houses were widely spaced and tended to be very small or very large. All of them seemed to have nice gardens though, and from time to time Nell would dart off the road to smell a flower. At the end of the road was a wooden gate... Past the gate, the road became a very rough mosaic of flagstones with grass growing between them.

It wound between undulating pastures where horses and the occasional dairy cow grazed... terminated at a great three-story stone building perched on the bank of a river that ran down the mountain from the New Atlantis Clave. (Stephenson, *DA* 241)

The culture of New Atlantis people has not changed though they are technologically enhanced. Their houses are built with natural woods unlike the houses of people in Leased Territories, which are built by artificial diamondoid. If the roof becomes damaged, the people of New Atlantis use hatchet to cut the redwoods to replace the old shingles on the roof. Harv and Nell got excited by looking at the houses built with the natural material. Neal Stephenson depicts this as “Harv was paralyzed with wonder at this exhibition and stopped walking” (Stephenson, *DA* 241). The New Atlantis’ houses are built with “a block long and replete with wings, turrets, atria, and breezy verandas” (Stephenson, *DA* 62). Rita, a stablewoman and caretaker of Nell in *Dovetail*, has a big

house built with natural products. Her shop and house “were each twice the size of Nell’s old flat and filled with fine things of heavy wood, metal, cotton, linen, and porcelain that , as Nell was beginning to understand, had all been made by human hands, probably right here in Dovetail” (Stephenson, *DA* 241-242). The materials used for construction are natural woods in New Atlantis.

In Dovetail, each and every product was natural and hand made. Though they have technological devices to produce artificial products, they don’t use it. If people want chairs, the craftsman uses wood to craft it in a method similar to the ancient period. They don’t like a chair from a nano technological device, which they considered as a fake. Nell, who lived in Leased Territories with full of artificial things, was astonished to see all the real stuffs in Dovetail. Once when Harv and Nell visited the house of Constable, “they discovered that each was ten times the weight of any other chair they’d seen, being made of actual wood, and thick pieces of it too... weight gave her a feeling of security” (Stephenson, *DA* 234). The chair with real wood gives her a more secure feel than the artificial chair from a nanotechnological device. The New Atlantis people celebrate their life which is intimately tied up with the natural environment.

The attire of New Atlantis is made up of real stuff. One day Nell was gifted a piece of real cloth from her mother Tequila, who works in New Atlantis. The Victorians always use real stuffed clothes rather than artificial cloths. Nell was very much confused and “did not understand the difference between real cloth and the kind that came from the M.C.” (Stephenson, *DA* 54). The real thread of the cloth made Nell eager and she started to observe “each thread going over and under other threads, and those ones going over and under all other threads” (Stephenson, *DA* 55). In Dovetail, Rita has brought a

handmade dress for Nell, which is weaved by a lady in Millhouse. This is the first time Nell wears a handmade dress which is sewed “together by hand” (Stephenson, *DA* 260). The materials which are produced through natural products bring happiness in the lives of people.

People in Dovetail followed the same culture though technology has developed a lot. They preferred ancient and traditional ways of living rather than artificiality. They admire nature’s extravagance and “all the people in Dovetail like to make beautiful things” (Stephenson, *DA* 261). Neal Stephenson explains the intimacy of people with the object made of natural stuff like wood as:

The Constable... opened a heavy wooden door with huge wrought-iron hinges, letting Nell and Harv in from their side. The tiny octagonal room was cluttered with fine furniture made of dark wood, a shelf of old books, and a small cast-iron stove with a red enamel kettle on top, pocked like an asteroid from ancient impacts, piping out a column of steam. The Constable directed them into a pair of wooden chairs... he manufactured the beverage, hewing closely to the ancient procedure, and set it before them. (Stephenson, *DA* 234-235)

The development in technology has altered certain cultures like usage of ancient methods in cooking, construction work, travel, education and so on. The technological inventions and internal adjustments lead ideas of people to get transferred which results in cultural change.

The implementation of technology has changed the things that are made of natural stuff into artificial stuff. The advancement in nanotechnology makes everything possible even for the poor people. Harv, Nell’s brother used to get blankets, mattresses and so

many things from a nano technological device, which uses artificial stuff to manufacture. Nell, who played only with the toys from the device, was amazed by “a tiny wooden doll in a calico dress”, which was gifted by a toymaker in Dovetail (Stephenson, *DA* 242).

Harv looks astonished to look at the real heavy woods, metals, cotton and so on in Dovetail. The upgradation in technology has replaced the natural stuff with the artificial stuff, which are easy to get by the poor people.

Neal Stephenson explains different cultures are followed by two different tribes, but only a few phyles like New Atlantis propagate their culture through education. “The highest levels of society received news written with ink on paper” (Stephenson, *DA* 36-37). People of New Atlantis distinguish themselves from the other phyles by reading newspaper written on ink, whereas the people of these community receive newspaper through the nano technological device. The economy of people and the role of technology in their life play a major role in transmission and shift in culture from time to time. The shift in culture sometimes prospers or sometimes diminishes because of the necessity. The enhancement in nanotechnology plays a major role in the life of these people to get their basic needs in a cost effective way. This is depicted as:

Some cultures are prosperous; some are not. Some value rational discourse and the scientific method; some do not. Some encourage freedom of expression, and some discourage it. The only thing they have in common is that if they do not propagate, they will be swallowed up by others. All they have built up will be torn down; all they have accomplished will be forgotten; all they have learned and written will be scattered to the wind... New Atlantis like many tribes, propagates itself largely through education. (Stephenson, *DA* 321-322)

In *The Diamond Age*, the invention of nanotechnological device is considered to be the infrastructure. This device is invented by the Victorians, a phyle, who rely on nature and use only the natural products. Thus the intervention of nanotechnological device alters the structure, the domestic life of these people, who are very poor and cannot afford to their basic needs of life. They utilized this nanotechnological device for getting their basic needs like food, mattress, toys, dresses and so on. This change in the structure of the these community results in building the confidence level among the people. Through nanotechnology cost effective harmful narcotic drugs were produced for the economically deprived people. Nell wanted to stop this “seed project”. Utilization of these drugs by the youngster and common man is a threat to the future of the community. Thus the structure affects the values of the super structure.

People are still struggling for their basic needs with a hope for a better life. In this novel, many transformative technologies are invented to lift humanity from degradation of poverty and ignorance. People in these community are not tired in trying to solve their problem and upgrade their life. The economical degradation results in their cultural change. Before the technological inventions, poor these people were not able to fulfill even their basic needs. Thus according to cultural materialism, technological inventions are considered to be the basic elements which alters the structure, i.e., the domestic life of people. The change in domestic life of people resulted in the loss of values and morality. Thus technology has brought a cultural shift. People of New Atlantis are trying hard to withhold their ancient culture and tradition without any change.

Cryptonomicon is the fourth novel taken for the analysis of this chapter. 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 eavesdropping with special equipment from an electronic device. The main purpose of Van Eck Phreaking is to spy on electronic devices. *Cryptonomicon* explains the code breaking, illegal money transfer and postwar technological development. The research of this novel focuses on the pre-technological and post-technological development in the communication sector.

The summary of the novel explains America's knowledge on cryptography and cryptanalysis. This novel *Cryptonomicon* is described as the Bible of the cryptographers. Cryptography is the intersection of other disciplines like computer science, electrical engineering, physics, communication science and mathematics. Cryptography helps in secure communication with the techniques by constructing certain protocols to prevent third parties from sending private messages. Cryptanalysis is used to break the security of cryptography and gain access to the encrypted messages.

In this novel, many characters from the 1990s are 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 the characters reappear and interact forms the novel's charm. This novel contains many themes like ridiculous military missions engaged by Corporal Bobby Shaftoe, efforts for code breaking and devastating amounts of money.

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 operations. Enigma is a machine used during World Wars to protect military communications by the German military. Bobby Shaftoe is a Chinese veteran, who serves in the unit 2702 by carrying out the plans of Waterhouse. During the time, Japanese soldiers along with Goto Dengo are ordered to construct a mysterious dugout in the Philippine mountains which turns out to be a literal suicide mission. Goto Dengo, a Japanese mining engineer and a friendly enemy of Shaftoe, is involved in a project to bury the looted gold in Philippines. In the 1990s storyline, he is pictured as a semi-retired chief executive of Goto Engineering, a huge Japanese construction company. 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 others 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 Manila 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 the computer has the power to break the encryption systems. Randy has distrust about 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. Randy is attracted to Amy.

During World War II, Bobby Shaftoe meets a Filipino girl named Glory and falls in love. He suffers from PTSD during the battle of Guadalcanal. Post-Traumatic Stress Disorder (PTSD), a psychiatric disorder, occurs when a person witnesses a terrific event or a natural disaster. He is rescued by Enoch Root from the aftermath of the battle. He is reassigned to Detachment 2702. It makes him puzzled due to its strange operation but later he understands that it is the trick for confusing enemies about the allied plans. Code of Enigma is broken by Alan Turing and Lawrence Waterhouse in England. They realize that the allies have used the piece of intelligence correctly. The allies can read every message that Germany sends. Goto Dengo is assigned as an engineer to build a big bunker in the mountains of Japan. He is very much confused by the purpose of this bunker.

In the 1990s story line, Amy Shaftoe and her father while working underwater come across the evidence of the hidden gold treasure, which was dumped during World War II. Her father Douglas says that the treasure identified while laying the underwater cable should be split up among them. Due to this condition, they do not tell this to the famous treasure hunter, popularly known as The Dentist. His name is Dr. Hubert Kepler, an evil investment fund manager. Randy and Avi have revealed to their potential business partners that their data haven is to be placed in the Sultanate of Kinakuta. It is considered to be the safest digital fortress out of the government control so that they can protect the privacy of customer's communication. They also have an idea of creating a digital currency on gold. Randy suspects that a few of his partners cannot be trusted.

During World War II, Lawrence is allotted to a remote island on the coast of Scotland. As a part of his work, he has to send messages about his U Boats. He starts a relationship with a house cleaning woman Margaret, though he knows that she is the spy of Nazis. Later he comes to know that the Nazis have broken the codes of their merchant ships. He devised a scheme of changing the codes when the code books are being captured. They can also read the German messages without revealing. Bobby Shaftoe along with the other members of Detachment 2702 reaches the U Boat that has been sunk. Later Bobby and his unit learn about the truth that Axis powers shift the precious metals to the Philippines for burial after recovering safely from the war. The ship comprises gold bars with Chinese letters on it along with the unencrypted messages.

Goto Dengo identifies that his assignment of building bunker is a suicide mission. The Nazis have the plan of causing collapse to the mine shafts after transporting a huge quantity of gold from the bunker. They plan to bury the treasure safely in secret. In the

1990s, Douglas and Amy identify the place of the secret gold bunker. The characters like Mr. Wing and Goto Dengo during the Second World War have come for the gold treasure. Despite all the plots weaved by The Dentist and his lawyer Andrew Loeb, Randy breaks the code 'Arethusa' used during the Second World War. This is the same code identified by his grandfather in U Boat code books. It tells of the existence of huge amounts of gold taken from a number of Asian countries before World War II. Randy is arrested for the false charges and he tries to crack the encryption and deliver the information to his friends. The gold which Randy and Avi have taken risk to use as electronic currencies is administered through The Crypt.

The study focuses on the cultural shift due to the development of cryptography, which plays an important role in today's technological communication. Cultural materialism is applied to trace the cultural change in the novel. From the ancient period, people used communication as a tool to pass on or exchange information. Ancient people used very little technology and it mostly depended on manual work. Though the process of communication is slow, it is still found in many places in the form of paintings and petroglyphs, a pictorial representation in rocks. Technological development has slowly crafted the methods of communication from ancient period to modern period like cave paintings by using symbols, pictograms, petroglyphs, pigeons, postal system, newspaper, radio, telegraph, telephone, television, computer and internet. After technological advancement in the communication sector, machines take the role of passing information from one end to the other end.

Initially the communication was wireless and manual. Later electronic communication came into usage. Due to advancements in technology, wired communication became wireless communication, which increased the speed of passing information further. Communication development not only transforms communication culture but it also has serious threats in modern times like hacking the information.

In ancient times army generals used drums, trumpets, flags, flaming arrows, messenger pigeons and fast riders to communicate or to pass on information with the other sections of their army. Communications occupy an important place in warfare than the weapons. Military officers would like to maintain secrecy about their message. But the opponent party will always look for the opponent's messages. During World War I and II, technology was implemented in weapons sector and information sector. In the Second World War, while the German army was sending secret message to their soldier, the allied power was trying to crack Germany's secret message. Cryptography and cryptanalysis played a major role in the Second World War.

In *Cryptonomicon*, Neal Stephenson explores the cultural shift after the arrival of cryptography, which provides secrecy, security and integrity to the communications. On the other hand, cryptanalysis, an art of cracking codes, holds an equal part in World War II. It is used to breach the data of the encrypted messages without knowing the key. Stephenson has written this novel from the sending end of the military messages rather than the receiving end. Cryptography has a deep history and it is traced in Egyptian and Roman civilization like hieroglyph, Caesar Shift Cipher and Steganography. Hieroglyph is considered to be the oldest Egyptian cryptographic technique, where the secret code was known only to the scribes who transmit the information to the king. Caesar Shift

Cipher is the Roman cryptographic method, where the letters of the message are shifted to an agreed number. Steganography is the next stage of using cryptographic technique through invisible watermarking.

During the nineteenth century, everything became electric which resulted in the invention of the Enigma machine by Arthur Scherbius, a German engineer, to pass on the military communications securely. On the other hand, Alan Turing, a British scientist, invented a Turing machine to break the codes of the Enigma machine. Stephenson explained vividly on the functioning of the three wheeled Enigma machine. When the German army decided to add the fourth wheel to the Enigma machine, the allied power found it hard to decrypt the messages. It is depicted as:

When the four-wheel Enigma machine had gone into service on February 1st (1942), the entire Atlantic had gone back. Alan (Turing) and the others have been going after the problem very hard ever since. The problem is that they don't know how the fourth wheel is wired up... They recovered a four-wheel Enigma machine, and though this doesn't break the code, it gives data they need to break it. (Stephenson, *Cryptonomicon* 202)

Stephenson has described military cryptography and the art of decrypting the code during World War II, which remains as a base for current cryptography. Through this novel, the importance of mathematics in cryptology is well explained. The coordination of military forces is impossible without instantaneous encryption. Waterhouse explains that the encrypted messages of the German army are decrypted using Alan Turing's machine named Bombes. Encryption and decryption determine life and death during the World War II.

Cryptonomicon is Stephenson's novel but it is also considered as a Bible for the cryptographers. It assists as a guide for cryptanalysis. Stephenson portrays this as "People speak of it as though it were a book, but it's not... It is everything that Commander Schoen knows about breaking codes, which amounts to everything that the United States of America knows" (Stephenson, *Cryptonomicon* 88). The errors in the book were carried out by Waterhouse and they find it is good enough to solve the whole cryptosystems. Stephenson explains this as "*Cryptonomicon* is terribly important, and they have wit to take the measures necessary to keep it safe" (Stephenson, *Cryptonomicon* 88).

Neal Stephenson reveals that cryptographers are the real fighters in the Second World War. Both allied and axis powers considered information as a precious weapon in the war. This novel has retold the history of World War II. According to Youngquist, the encryption and decryption of codes occupies a major place in winning the war. It is depicted as:

For Stephenson, cryptographers fight the real battles. Bombs scream and bullets spit only after codes fly, communicating command and control. The encryption – or decryption – of those codes becomes all important to the military objective of winning any given battle and ultimately the war... It retells the story of World War II from the perspective of its cybernetic architects, the gifted cryptologists whose devotion to *information* – coded or decoded – helped secure life in a global theater of entropy. (Youngquist 334)

This novel not only traces the military cryptography but also the way the postwar cryptographic culture falls into programming. Cryptographers of World War II broke the code for life but the cryptographers during the 1990s used cryptography to create data-

haven for money. The development of postwar cryptographic technologies shifts the goal of cryptographers from saving life and power to money. In the 1990s storyline, Stephenson brings out the change in cryptographic culture from military to digital present, where cryptanalysis is turned as a business practice.

In the 1990s storyline, Randy, the grandson of Lawrence Pritchard Waterhouse, is a very good cryptographer and Math geek. Unlike his grandfather, who used cryptanalysis to crack enigma code to win in World War II, he made use of cryptography to build a dot-com Start-up Company. He wants to begin Crypt, a data haven, in the South Seas sultanate of Kinakuta. The Crypt, a cybernetic bank, is considered to be the black-holed data haven. Randy wants to establish Crypt to provide “a safe house for information of economic value” (Youngquist 341). It is virtually equal to Swiss banking to place anonymous money. Randy further says that “Why didn’t Hitler invade Switzerland? Because the Nazis couldn’t have done without it. So the Crypt definitely fills a niche” (Stephenson, *Cryptonomicon* 1045). The ultimate aim of military cryptography is to win and to gain power over the enemy. But the aim of postwar cryptography is to establish the business and to maximize the client’s security to gain money.

In *Cryptonomicon*, the infrastructure is cryptography, which is the technology used in communication system during the World War II, which alters the structure. Cryptography played an important role in the Second World War. By breaking the code of Axis powers, Allied powers won the war. Thus due to the change in the infrastructure, the structure of the political economy gets changed. This change in structure influences the future of cryptography. The enhancement in cryptography alters the super structure. As a result, man has lost his honesty and ethical values. The post war cryptographic

culture falls into programming and in building strong communication. Thus development in cryptography alters the communication system. Man has devised systems to hide the communication from the enemy. Information has taken the digital form of bits and bytes. Digital signatures can protect information from forgeries. But cryptography does not protect information against the threats and vulnerabilities due to poor design of systems. The interest of people in cryptography has grown into the sub-culture of hacking the information.

The fifth novel taken for analysis is *Seveneves*. The summary of the novel brings out various efforts of human beings to preserve human life and other species from the apocalyptic events on earth due to the disintegration of the moon. The recreating of the human race as a space based civilization after serious efforts is explained in this novel. Cultural materialism is used to analyse the cultural difference on Earth and space.

The moon is shattered into seven pieces by an unknown agent. These seven pieces start to collide with each other and the number of pieces starts to increase. The small broken pieces begin to enter into the surface of Earth within two years and form a white sky. The bolides fall on earth and make it uninhabitable for thousands of years. Before the Earth gets destroyed, it is planned to send as many people and resources as possible to Cloud Ark, a spacecraft in space. Each country can send a few young people to space in order to preserve the human race. The Cloud Ark is designed in a way to be self-sufficient for five thousand years. Once when the Earth becomes inhabitable then it can be repopulated from space. Around a thousand five hundred people including scientists, physicians, technicians, specialists and researchers are sent to space. Human genetic archive is also

sent to Cloud Ark to regenerate human generation before the hard rain starts. The genetic archive of non-human living species is also sent to the Cloud Ark. It is kept under the digital equivalent of lock and key.

Markus Leuker is appointed as the leader of Cloud Ark. The rule for entering into the Cloud Ark is that the person should not be a member of government. But Julia Bliss Flaherty, the President of the United States, gets into the Cloud Ark herself at the last minute. After two years, the moon destroys and the hard rain begins as predicted. Human race and all life on Earth are wiped out. The Human Genetic Archive which is attached to the Cloud Ark is destroyed by an arklet by leaving the samples alone. On the Earth, a few people including Dinah's father dwell in an underground fortress and Ivy's fiancé in an underwater bunker.

In the space station, controversies go among the space dwellers for changing the place of the Cloud Ark. Julia Flaherty gathers a few members in order to support her view of adopting the decentralization plan and going on an expedition to Mars. Their careless departure to Mars through Swarm causes some damage to the parts of the space station and also they discard the samples of the Human Genetic Archive accidentally. The undamaged remains of both the space station and Cloud Ark are combined together called Endurance. They plan to keep this Endurance on the cleft. It takes three years for the Endurance to reach the cleft. The population of the Endurance gets reduced due to radiation and meteor strikes. Julia Flaherty's Swarm is further divided into groups and starts to fight with each other. Soon the Swarm runs out of food and water. They start to

die of starvation. The survivors take the option of cannibalism. After all these battles, both the people of Swarm and Endurance get reunited. At last only eight people remain and all are women. In that, Julia Flaherty is in past menopause.

The seven women are called as Seven Eves. They have enough resources in their genetic laboratory to rebuild the human race. They use parthenogenesis as an instrument to recreate human race. Parthenogenesis is a process of producing an embryo from an ovum without fertilization. Each one can have their own power to modify the characters of their offspring and also they visualize seven new races will form in the future.

Five thousand years later, billions of human beings live on the earth's orbit. They are divided into seven different races. These races are grouped into two, Red and Blue. Both the groups are involved in the cold war. They are working to recreate the Earth for living. These people, when they reach Earth, discover that two more races are living on the Earth. They are Diggers and Pingers who live beneath the Earth's surface and under the oceans respectively. This causes confusion among the space habitants.

Later, the Diggers join the Red group and Pingers stick with the Blue. Epilogue of this novel brings to light that the underwater ark is built by Ivy's fiancé as like the Cloud Ark through the information he gets through the selfie images of Ivy which she has sent him. A bar has been run in the cleft by a man called Ty. He invites a representative of each race to his apartment with the hope of forming the first Nine.

The application part of this novel analyses the three aspects of cultural materialism: infrastructure, structure and superstructure based on the emergence of new culture in space due to the destruction of the Earth and the evolving cultural difference. Human beings' life on earth is the infrastructure, which gets affected due to the

disintegration of the moon. Cloud Ark, a spaceship, is the technology which interrupted man's life on earth. Human beings reconstruct their culture in an orbital environment under the artificial circumstances. Disintegration of the moon and technological advancements lead to a sudden shift in the life of human beings. Neal Stephenson describes the struggle of human beings in getting adapted to new space culture.

In *Seveneves*, Stephenson lays out the adaptation of new life in space due to the catastrophic natural disaster of the Moon. The demography of the world is affected. People felt tough due to the sudden shift in their life from Earth-based culture to space-based culture, which is full of technology. Common people might have an imagination on life in space but when they undergo the situation in reality, it is hard to survive in the new environment.

The second aspect is structure in which the family structure and ecosystem are affected in space ship. Babies and children can have better cognitive, emotional and physical development when they live in a natural environment. Neal Stephenson explains that it is very tough to handle babies and children without proper facilities in the space. It is impossible to keep a kid quiet in Space like playing a video in the car's DVD player during a long drive. In Cloud Ark, though women became pregnant, the embryos are preserved in a frozen state so that it could be implanted later. The natural process of pregnancy and childbearing are changed towards artificiality. It is depicted as:

One of the items on her long-term to-do list, actually was... how to handle pregnancy aboard the Cloud Ark. Since pregnant people weren't fundamentally that different from those who weren't, what that really boiled down was how to handle babies... this was going to be an orderly process, and that anyone who got

pregnant would do so with intent of having the embryo frozen so that it could be implanted later, when conditions were better for raising little ones. (Stephenson, *Seveneves* 281-282)

The daily routine on earth completely gets changed in orbital environment. People cannot walk freely or they cannot relax themselves by going to a coffee shop in space. It is impossible to have a variety of dishes for breakfast in the morning. The Hard Rain on Earth has changed people's long-term routine. Dr. Moira Crewe, a scientist, did not like a few aspects of Cloud Ark culture like restricted food items. The lack of freedom for consuming food in the orbital environment is expressed by Stephenson as "there are no coffee shops to have breakfast in when she woke up, and no public houses in which to socialize at day's end" (Stephenson, *Seveneves* 274).

The culture between the earth and space differs especially in food. In space due to artificiality, people have to use only the stocks that are brought from earth. Stephenson describes "The cultural shadings were perpetuated by food... since space food was lacking in variety, this was largely a matter of spices" (Stephenson, *Seveneves* 405). Unlike earth, there is no place to grow crops for food. This will be resulted in scarcity of food which paves way for the people to consume energy capsules. The "freeze-dried coffee" and "freeze dried oatmeal" are available instead of fresh newly brewed coffee and cooked oatmeal (Stephenson, *Seveneves* 275). Dr. Moira Crew's love towards the nature-bound culture is understood when she talks about growing barley in space. She says "they didn't have the capability, yet, of growing coffee or barley in space, so the supply of consumables was going to run out pretty damned soon" (Stephenson, *Seveneves* 275).

The third aspect is superstructure, which is affected due to the change in structure. This led to alternate domestic structure which results in lack of basic needs and moral values. This resulted in the disintegration of Cloud Ark. Thus people of space seek an alternative shelter for life. In order to avoid scarcity of materials in space, recycling was done. The scientists plan to recycle human urine to prepare water and they split hydrogen and oxygen from water to manufacture hydrogen peroxide, a propellant to run engines. This is described as “we can recycle our urine to make drinking water... with water we can make hydrogen peroxide – a fine thruster propellant – or we can split it into hydrogen and oxygen to run big engines” (Stephenson, *Seveneves* 126-127). In an orbital environment, recycling becomes necessary to get the needs of people.

Neal Stephenson explains the consequences of fuel fleas in space. Fuel flea is a minute microscopic radioactive material, which is considered to be highly dangerous. In *Seveneves*, Sean, a scientist, lost his life because of swallowing fuel flea unknowingly. Stephenson depicts fuel flea as:

He swallowed a particle of fuel. Probably a fuel flea that got loose and somehow was tracked in here... Now that fuel fleas were killing people, it was time to learn about them. A tiny piece of uranium or plutonium that has gotten loose from a ruptured rod. As it throws off alpha particles, it zigs and zags around the room – conservation of momentum. So it hops around like a flea. The point is, it is small and it makes a lot of alpha. It lodged in a diverticulum in his bowel. It burned through his bowel wall and started a bleed that could not stop. (Stephenson, *Seveneves* 393-394).

Moira, a scientist, described that living in space is “living dangerously” (Stephenson, *Seveneves* 359). Radiation in space is higher than the radiation on Earth. When people are exposed to higher radiation, it will result in increased risks like cancer and nervous system breakdown. A cancer patient in space became over stressed and decided to commit suicide in spite of using the limited resources like food, water, air and medicines. People in space commit suicide by going out of cloud ark for a walk. This depicts that it “was clearly a suicide mission” (Stephenson, *Seveneves* 504). It is because of exposing a large amount of radiation. Like earth, the medical facilities for treating cancer are not much on hand in space. It is explained as “people who went on space walks were much more likely to die of radiation exposure, bolide strikes, equipment malfunction, misadventure, or contamination by reactor fallout” (Stephenson, *Seveneves* 506).

The loss of population in space due to radiation results in lower gender ratio of male. Stephenson utters that the physical arrangement of human beings is well suited to live on Earth than on the space. Human beings need more food and air, which are lacking in space. The health and mental status are affected in space due to minimized consumption of food and air and floating in sack by watching the same videos again and again. Julia, ex-president of America, explains the necessity of socialization in space. Without talking with one another, people live a lonely life resulting in depression. She further conveys that human beings have to sleep well and exercise for a healthy mind and body.

The destruction of the earth due to disintegration of the moon resulted in affecting the demography of the world. Life on earth becomes uninhabitable. Thus the change in infrastructure results in breaking the family structure and collapsing the ecosystem.

A temporary structure is set in space, where they can get only artificial food, air and shelter. People in space have to follow certain rules in order to survive. They spend their time alone in space. There is no socialization among people in space. This alternative domestic structure in space paves way for changing the super structure. The lack of basic needs and socialization result in making people to lose their moral values and eventually population.

Thus in this chapter, through cultural materialism it is explored that culture has been changed due to technological intervention in the industrial sector, information storage system, nanotechnology, cryptography in communication and space science which result in pollution, online addiction, devoid of natural products, hacking secret messages, human beings consuming artificial air, food and recycling water. Culture shapes the biodiversity of nature. When the culture is such that it affects the biodiversity, the ecology and human society are also affected. Technological development and its implementation in human life play a major role in changing culture. Since digital technology brings a change in the infrastructure of the society, there is a change in the structure. This change is evident in superstructure as well. As a corollary, in *Zodiac*, the ecological values of Boston harbor are lost; in *Snow Crash*, common man's brain is affected due to virus and it also leads to death; in *The Diamond Age* through nanotechnology, cheap narcotic drugs are produced which would affect the future generation through seed project; in *Cryptonomicon*, hacking is legalized, eventually humanitarian concern and honesty are lost; in *Sevneves*, due to the violation of rules and loss of values, Cloud Ark, the space ship is destroyed. Hence they lost their shelter, the basic need. Thus due to change in the technological lifestyle of people, there is a shift in the culture of the society.

The next chapter deals with the role of cyborgs in the select novels to investigate the bond between man and technology. To redeem the lost ecological values; to stop the spread of virus, Snow Crash; to stop the production of narcotic drugs; to minimize security breach due to hacking culture; and to find an alternative shelter to rebuild humanity, it is immanent to analyse the role of cyborgs in the technological society.