ALMA MATER STUDIORUM – UNIVERSITÀ DI BOLOGNA

DOTTORATO DI RICERCA / PhD PROGRAMME IN:

Science, Technology, and Humanities

Ciclo XXIII

Settore/i scientifico-disciplinare/i di afferenza: L-LIN/10

Recognizing Cultural Concepts:

Joyce, Woolf, Mann and Musil.

PhD candidate: Armando Daniel Caracheo Montes de Oca

Coordinatore Dottorato   **Relatore**

Prof. Giuliano Pancaldi   **Prof. Vita Fortunati**

Esame finale anno 2011

To Maria and Ger.

TABLE OF CONTENTS

ACKNOWLEDGMENTS.

This thesis would not have been possible without the support of many people. Being its theme an area of study, which is not particularly from an established field of knowledge, I needed the support and the help of historians of science and technology, as well as scholars in the area of comparative literature.

I would like to start to thank the people of the CIS institute that belongs to the faculty of philosophy, Bologna University. I would like to thank, especially to Martha and to Anna, whose comments and insights were very helpful for me to find direction in the very beginning of the PhD.

The first year was a year with a lot of doubts. Coming from the field of physics and the history of science, it was not easy to find the path through the discourse of science and literature. The changing of methodology and above all the required information, the books I had to read, all of it was new to me. I remember the day Anna introduced me to *The Man without Qualities* and how while reading it I thought I wanted to include it in this thesis. For the introduction of the thesis, Anna's advises regarding books and material was of great help. Being a historian of technology she outlined a couple of books which were of an important relevance to the topics I wanted to speak about, for sure without her help the introduction would be completely different. Martha also provided me with a lot of helpful books which were related to the field of science and literature and which, although I did not use all of them within the thesis, as an introduction to the theme were very helpful. Both of them were always at the CIS and were always eager to dedicate me some minutes to speak about my progress and to help in any way they could. Apart from the academic aspect, both of them were also very supportive in that first year, I always had the impression that they cared about me and realised how hard could be to be in a country that is not yours. To both of them, thank you very much for your time and your help.

I cannot think in any other place where I would wanted to do my PhD. The figure of Giuliano represents the kind of scholar I would like to be in the future. His constant hard work (most of the time he was the first one who arrived to the institute) and how compromised he is with the PhD, are only some of the aspects that make me think like this. If the first year was hard, the second year was harder. I could not find the way on how to write the first chapter of the thesis; I could not find a structure. I did not know how to write (still I am not as good as I would like to be). However, Giuliano had a lot of patience with me. One of the most important days of these past three years was the day that he send me an email telling me that finally I achieved to write something close to how it should look a chapter of a thesis, he was happy I think, and I was happier. I learned a lot about him, about the several 'working tools' seminars dedicated to us PhD students. I want to recognise and to thank for all the time and the disposition he had towards my work for the last three

years, I have never had a professor like him, thank you very much Giuliano, I will always be thankful for the opportunity you gave me.

If it was difficult to find a structure and Giuliano was important for it, then at the same level I have to recognise the work done by Vita, who taught me how to address my thoughts about science and literature, how to write about science and literature. I think that from the very beginning Vita knew how hard was to write on this topic, especially coming from the field of science. If somebody was patient with me, she was. Always very kind and very interested in my thesis, Vita recurrently invited me to congresses and seminars that she organized. She was very busy with ACUME 2, however she always found the time to see how my dissertation was proceeding. I learned a lot from her, she introduced me to the academic approach of science and literature. She provided me with the enough material to be aware of the discourse of science and literature. The constant interchange of ideas at the reunions we had, were very valuable for the topics I wanted to address in this dissertation. For all the hard work, your remarks and suggestions, many many thanks.

The last four months of the PhD were very intense. I went to Exeter University to finish the thesis. I thought that in Bologna there was not enough first hand information and that my thesis had a lack of it, I was right. However, what I did not know was that the ideas included in the thesis also needed to become as clearer as possible. Here I found a person who helped me as if actually she was the responsible of the thesis. Thank you Vike for all the effort you put to my thesis, thank you for your observations and suggestions. For sure without your help this work would not be as complete as it is today.

I would like to thank the people that although were not part of the development of the thesis, they were very supportive on an emotional aspect. First to my colleagues Matteo and Jan who apart of colleagues have become my friends, to have lunch with you and a social life was always pleasant. Second, to Cristiana, who literally had the will to support me. I know it was not easy and I appreciate it, thank you for your company; it is always better when you are there.

Last to my family. To my grandmother, my mother and my brother. It all started five years ago and it has not been easy. I dedicate you this thesis. For all the effort and the love and the care. Also to my friends, my closest and dearest friends, without your laughs and good talk I have the impression that something is constantly missing.

Introduction

> Spaces are subject to changing perspectives, thoughts, and feelings and suffer the unceasing transformation of things in time.[1]

It would be a mistake to take the science and technology of a period as apart from the culture and the surroundings in which they arose. Nowadays the history of science and technology tries to understand scientific and technological developments not just as the achievements of scientists, inventors or engineers who were isolated from the occurrences of their times. Instead, the cultural history of science and technology is about understanding the interaction of the scientist and engineer with the political and economic circumstances of a country. It is also about trying to understand how the theories, inventions and innovations become inherent to the understanding that a culture can conceive of the world.

It is true that a scientific theory or a particular technology are developed within a cultural context, but history can be seen from another perspective, taking into consideration that events have happened within particular scientific and technological circumstances. And if this perspective is considered while analyzing events, such as the literature of the period, then one valid question to ask might be, what were the scientific and technological circumstances that impacted the narratives for example of the beginning of the twentieth century?

The following four chapters will focus on modernist literature's reception of notions such as simultaneity, multiple points of view, relativity and acausality, which arose in a specific scientific and technological context. Each of the four authors selected, James Joyce, Virginia Woolf, Thomas Mann and Robert Musil, will in a certain sense establish a dialogue with the scientific and technological innovations of the age. They will utilise the above listed concepts which were becoming part of the culture, and which were also at the core of the scientific and technological innovations of the first decades of the 20th century.

There are differences between the approach to scientific concepts of the literature of James Joyce and Virginia Woolf on the one hand, and that of Thomas Mann and Robert Musil on the other. The two former were immersed within the context of the British Empire, where there were marked signs of a positive attitude towards science and technology.

> The Great War did indeed enhance the status of the scientist, and secured permanent government support for scientific research on a scale unknown before the war. While this increased state support was welcomed by scientists there was also more than a twinge of regret at the devastation caused by the war, and by the new weapons that came out of belligerent's laboratories. However, the general view was that

---

1 Kern Stephen. *The Culture of Time and Space: 1880-1918*. Cambridge, Massachusetts. Harvard University Press, 1983. p.149.

the corruption of science was something the Germans, not the British, had brought about.[2]

The two other authors were immersed in a context of Germany's defeat, where there were frequent signs of a pessimistic attitude towards science and technology.

> …there was in fact a strong tendency among German physicists and mathematicians to reshape their own ideology toward congruence with the values and mood of that environment—a repudiation of positivist conceptions of the nature of science, and, in some cases, of the very possibility and value of the scientific enterprise.[3]

These different environments will result in different perspectives from which these authors spoke about science and technology within their narrative. After the year 1918 when Germany lost the First World War, a change of attitude within German society towards science and technology took place. This event and its consequences in society's perception of science and technology will be taken into consideration to understand how the four authors made use of the scientific and technological notions from different approaches.

Today in our cultural environment the words simultaneity, maps, different viewpoints, relativity and acausality are well-established conceptions. This afternoon I can connect to the web and dial directly to the other side of the world and start a conversation with my brother. I can learn what the weather is like and he can tell me what he is doing in that precise moment and also, what he will be doing in the next few hours. Through his descriptions I can gain a perfect image of where he is localised and what the surrounding space looks like. We can also have simultaneous impressions of what is going on in a European city and an American city, and if external observers could hear the conversation between my brother and me, they would have the point of view not just of one of us, but of both. Today western culture is used to the concept of multiple points of view and to understand that the same event can be interpreted completely differently by two or more observers. Furthermore, nowadays the word map is used not only to refer to a geographical space, but has evolved, and is used in various fields of knowledge like chemistry, biology and astronomy to mention just three. The concept is used to represent and to explain the role that the several elements of a set develop within a complex structure, such as chemical elements, the genome, or the universe.

In this first decade of the 21st century two notions that are no longer ideas foreign to society were beginning to gain acceptance at the beginning of the 20th century. One refers to time dilation, where time is relative to each observer. The second is the acausality of events, where natural phenomena

---

[2] Edgerton D.E.H. 'British Scientific Intellectuals and the Relations of Science, Technology and War'. In *National Military Establishments and the Advancement of Science and Technology*. Paul Forman & José M. Sánchez-Ron Ed. Dordrecht; Boston; London. Kluwer Academic Publishers. 1996. p.6

[3] Forman Paul. *Weimar Culture, Causality, and Quantum Theory, 1918-1927: Adaptation by German Physicists and Mathematicians to a Hostile Intellectual Environment*. On *Historical Studies in the Physical Sciences*, edited by Russell McCormmach. Philadelphia. University of Pennsylvania Press. 1971. p. 7.

can only be described by the laws of statistics, and only a probability that an event occurs can be established.

In this techno-electronic world these notions are no longer strange to us, but things were completely different 100 hundred years ago. Around the end of the 19th century, the ideas of simultaneity, multiple points of view, relativity and acausality were not commonly understood notions in society, and the scientific and technological developments that took place played a specific role in the acquisition of these notions by the English and German societies.

For a better understanding of the chapters below it is necessary to contextualise several aspects of the world our four authors were born into. Communication networks were being established all around the world and with them electro-communication technologies came to be an issue, a cultural preoccupation making artists and writers wonder about the way in which our individual senses could describe other senses. These communication networks also caused the artists and writers to wonder about how particular concepts could be representative of all the arts, synaesthesia and symbolism. Telegraphy and Morse code were the technologies that created an unconscious departure point for modern synaesthesia and symbolism.

The materialization of the new technologies for machines, communications media and global organization, are in part responsible for the transformation of the ways in which artists and writers began to communicate. The potential for communication that emerged from this materialization generated and expanded narrative possibilities. Of course, this phenomenon did not occur in isolation, without interacting with the society.

This introduction will be divided into four topics: (1) the Eiffel Tower as a cultural symbol of western culture, (2) the technological developments of the telegraph, wireless technology, the global synchronization of clocks and the development of a complete map of the world, which occurred in the second half of the nineteenth century and the first decades of the twentieth, (3) the scientific and mathematical structure and achievements of particular individuals, (4) the conception of time and space acquired by modernist writers. These four themes will introduce the following chapters on the writers James Joyce, Virginia Woolf, Thomas Mann and Robert Musil, who employed these new notions of time and space.

In this introduction it will be seen how the ideas of simultaneity, multiple points of view and mapping were born in an English technological context, where developments like the telegraph, wireless technology and the global synchronization of clocks took place. As will be seen in chapters 1 and 2, these ideas are important to the narrative of James Joyce and Virginia Woolf. Furthermore, apart from English technological developments, Albert Einstein's relativity theory and the philosophy of science of the French mathematician Henri Poincaré in his *Science and Hypothesis*,

also took the same ideas into consideration. Both scientists are relevant for contextualizing other elements it is important to appreciate for how Joyce and Woolf understood the above concepts. So the third topic to be outlined here will be the scientific and mathematical achievements of the beginning of the 20th century.

 The theories of relativity and quantum mechanics after the end of the Great War in 1918, were also considered for the ideas that the German authors Thomas Mann and Robert Musil generated and reflected respectively in their narratives.

However, the end of the war and the different consequences it led to in the two societies regarding the conception of science and technology and their role as a source of natural knowledge, differences will be seen between the ideas developed by the English language James Joyce and Virginia Woolf, and the Germans Thomas Mann and Robert Musil.

In the case of Joyce and Woolf, the first two chapters will outline a more positive attitude towards scientific discourse and the technological developments that were becoming part of the society in which they operated. In the case of Joyce, his rapport with maps will be explored, whereas in the case of Woolf her rapport with the motor car will be emphasised.

On the other hand in the case of Mann and Musil, the ideas these authors will generate and the way in which they develop these concepts within their narrative, as will be seen in chapters 3 and 4, will be a perception of science and technology closer to the concepts of decadence and uncertainty. These chapters will outline Mann and Musil's recognition of the role of science and technology as an explanation of the world. In chapter 3, how Mann's *The Magic Mountain* will confront the idea that time can be measured will be seen, whereas in chapter 4 how Musil's *The Man without Qualities* evaluates whether acausal events and their implications could be developed within the narrative will be outlined.

One of the events and cultural symbols which were relevant for science and technology and which at the same time was part of the scientific and technological developments of western culture, was the construction of the Eiffel Tower. For this introduction it is important to mention what the Eiffel Tower symbolised and how it was linked to science and telecommunications.

1. *The Eiffel Tower*.

The Eiffel Tower was introduced to the world in the 1889 World Fair, a commemoration of the French Revolution that had taken place 100 years before; its Arch was the entrance to the Exposition Universelle. This exhibition was the 13th of its type; the first one taking place in London in 1851, 'The Great Exhibition', or the 'Crystal Palace Exhibition'.

> This tower, made wholly of iron, will be the loftiest monument in the world. It is placed in the grounds of the great Exposition held in celebration of the centenary of the French Revolution of 1789. The building

is in the Champ de Mars, the scene of former successful exhibitions, as well as of many remarkable events in the national history.[4]

From 1851 on these exhibitions were mainly devoted to showing the cultural and industrial achievements of the host country, their other main attractions until nowadays being the pavilions of the various countries invited to participate in the fair.

As part of the industrial advances shown in the fairs, gradually the scientific and technological advances were also included as an important feature of the exhibitions, reflecting the advances in these sectors.

The World Fair of 1889 was the fourth one hosted by France. Because of the centennial anniversary of the French Revolution, the French government wanted to create a representative structure testifying to the greatness and advances of French culture. The monument also wished to represent the technological advances of the age and, although the structure in the first place was meant to be demolished after 20 years— just as had happened with all the other constructions that had been made to host the ceremony in the past—with the Eiffel Tower it was different. Its usefulness as a scientific and technological laboratory, after the end of the Fair and until the present day, was and is the main reason why the tower has not been destroyed. This aspect of the tower will be illustrated below.

The architect who designed the tower was Stephen Sauvestre, and the structural engineers in charge of the project were Maurice Koechlin and Émile Nouguier; the contractor was Gustave Eiffel & Cie. With a budget of 8.6 million pounds for the development of the fair, in 1886 the French minister of Commerce and Industry, Edouard Lockroy, had in mind the creation of a tower which could symbolize, like the pyramids and the gothic cathedrals, the development of a culture. He asked for a variety of architectural plans and received over a hundred different projects.

> Paris is to have the greatest tower in the world after all. M. Eiffel's tower which the government has authorized him to raise on the Champs du Mars, will dominate all Paris, and surpass, in fact almost double, in height the highest existing structure. Liberty, to whom such homage was paid the other day for her grandeur and greatness, is but a pigmy of the statue world compared with this gigantic monster. Lord Nelson's monument is 162 ft., the "Monument" 202 ft., Liberty 220ft., St. Paul's 360 ft., the Great Pyramid 460 ft., St. Peter's of Rome 507 ft., Cologne Cathedral 522 ft., the Washington Monument, at present the highest in the world, 555 ft., and the Paris Tower, 1000 ft.[5]

The design of Gustave Eiffel, a structural engineer graduated from the École Central Paris, was the project that won the contest. The credit, though, was for his research director Mauriece Koechlin. The height of the tower is 300.65 meters, without counting the broadcast antennas that

---

[4] The Child's Companion (London, England), [Date Unknown]; pg. 83. (329 words). New Readerships.
[5] 'The Highest Monument in the World'. The Pall Mall Gazette (London, England), Tuesday, February 15, 1887; Issue 6838

transmit from its highest part since 1909, and 324 meters, counting them.[6] Although early on these transmissions were intended only for military purposes, from the beginning of the 20th century until now the antennas are still functioning.

The tower was inaugurated on 31 March 1889 and opened on 6 May of the same year. It was almost the end of the 19th century, and the world was changing fast: France was intent on building a colonial empire, the industrial revolution all over Europe was changing the social structure and Jules Verne was writing some of his futuristic novels containing imaginative devices, later to be realised by technology. Furthermore, technological advances such as the invention of the telephone (1876) and the invention of the phonograph (1877), only a few years before the construction of the tower, were discoveries that changed communications between people around the world.

From the beginning of the tower's construction, Eiffel saw that the tower could extend its lifetime by becoming a scientific and technological laboratory where experiments such as observation in the fields of meteorology and astronomy, an electric light signal and physics experiments, to mention a few, could be carried out.

> From a scientific point of view, it will enable a pressure of 400 atmospheres to be measured, which as yet is unattainable by any instrument. The tower will be used as an observatory. From a military aspect it can be used as an optical telegraphic station, communicating with distances so far apart as Rouen and the basins of the Rhone and the Loire.[7]

The Eiffel Tower will have a great impact on military telecommunications based on wireless telegraphy. The history of the Eiffel Tower and telecommunications devices dates back to 1898 when the first wireless telegraph link was installed. In 1899 several experiments began to be run to establish the Tower as the main terminal for the sending and receiving of messages.

> A Boulogne Correspondent states that the French authorities are so gratified with the success of the wireless telegraphy demonstrations between Boulogne and the South Foreland that it is proposed to try the system from Paris. It is stated that the Eiffel Tower will be the French terminal, owing to its great height, 935 ft., the English terminal remaining at the South Foreland. The direct distance about the two points is about 230 miles.[8]

It was in 1903 when Eiffel allowed the French Minister of war to install antennas on the highest part of the tower. In 1904 the military network was gradually being installed and between 1907 and 1908 a link was achieved between the tower and Casablanca. In 1909 the first French 'military radio-telegraph station' was launched, and in the same year the wireless telegraphy was also launched. In 1910 the French Navy occupied a time signal transmission service, and Commander

---

[6] Data obtained from the Eiffel Tower official website: http://www.tour-eiffel.fr/teiffel/uk/.

[7] 'The Parisian Tower of Babel'. The Dundee Courier & Argus (Dundee, Scotland), Friday, June 15, 1888; pg. 7; Issue 10900. 19th Century British Library Newspapers: Part II.

[8] 'Wireless Telegraphy'. The Standard (London, England), Thursday, April 06, 1899; pg. 6; Issue 23330. *19th Century British Library Newspapers: Part II.*

Ferrié saw the possibilities in two applications: the first was the creation of an international organization based on this time signal transmission, the first attempt to organize the measurement of time throughout the entire world. The second application referred to the possibility of accurately measuring long distances by emitting wave signals from the highest part of the tower and sending them towards wave receptors located far away.

From its inauguration, and until wireless telegraphy was settled on as a dominant form of telecommunication, 20 years passed and with it, as shown below, the chance to map the world. Since then, the Eiffel Tower came to signify a symbol of several improvements in French society, wishing to reflect with this engineering achievement the progress the country was accomplishing in the areas of science-based technology. In subsequent years, the Eiffel Tower came to be considered a symbol, especially of the technological developments taking place in the course of the century in Western Culture.

> In France, Eugene Ducretet constructed radio equipment which he used for experiments in the autumn of 1898. He transmitted radio signals from the Eiffel Tower which were received near the Panthéon on November 5, 1898.[9]

The Eiffel Tower not only came to be thought of as an architectonic structure representing the technological improvements of the epoch, it also came to signify the symbol of a nation which was in a race to become one of the most powerful nations in the world.

The next section will outline the development of some communication technologies such as the telegraph, the railway and the iron-hulled steamboat, and how important these technologies were to achieve a complete notion of what the earth looked like. The development of these technologies, as well as the Eiffel Tower, were fundamental to the achievement of a complete map of the world, created by the first years of the 20th century.

2. *End of the 19th Century: Technological Developments.*

In 1851, London's Great Exhibition showed to the world British advances in industry and commerce. The Crystal Palace, constructed for this purpose, was a symbol of the industrialism that had recently been achieved by several communities in England.

The industrial revolution sent British technology into a direction aiming also at the imperialist policies to be followed in the nineteenth century. The telegraphs, steamships and transcontinental railroads were basic to making these imperialist policies affordable as well as effective:

> Steamships, telegraphs, and transcontinental railroads were among the technologies that made imperialism effective and affordable. The "gunboat diplomacy" deployed by the British with great success in China, India, and Africa against poorly armed native peoples depended on the construction of

---

[9] Huurdeman Anton A. *The Worldwide History of Telecommunications*. Hoboken, New Jersey. John Wiley & Sons, Inc. 2003. p. 213.

iron-hulled, steam-driven, shallow-draft vessels that were heavily armed.[10]

A new technological era followed the Exhibition in London and the people involved in this process were not primarily identifiable with the state but engineers and inventors, as well as capitalists, some of whom turned their attention from the factories to the technologies able to communicate with the overseas empire. Imperialism marked the path for the development of these new technologies. The railroad, telegraphs and steamships, fulfilled the western realisation that the economy and politics of a country could expand its confines.

To achieve better penetration and control in the Indian sub-continent, by the mid 19th century new technologies were necessary. Some of the primary objectives were to improve transportation, safe communication, and above all to increase as far as possible military control, and the only way to achieve this had to be based on what the new technologies could provide.

1870 saw two telegraph connections between London and India functioning. One of the lines went from Europe to the Iranian city of Tehran, and was connected to the Pakistan city of Karachi via the Persian Gulf. The other line went from England to Bombay via the Atlantic, the Mediterranean and the Red Sea. In 1873, messages from England to India and vice versa took no more than three hours to arrive.

> Not until 1870 was there a reliable telegraph connection between London and India (see fig. 4.3). The first line to open, a double land line running across Europe to Tehran, where it connected with a cable to Karachi via the Persian Gulf, was built by the German firm of Siemens and Halske, a leader in the second industrial revolution (see chapter 5). A second telegraph, also opened in 1870, went wholly by undersea cables from England to Bombay via the Atlantic, Mediterranean, and Red Sea. By 1873 telegraph messages between England and India took three hours. The British went on to lay undersea telegraph cables literally around the world, culminating with its famous "all red" route—named for the color of imperial possessions in the official maps—completed in 1902.[11]

British undersea telegraph cables by 1902 surrounded the world. This route, from England to Australia via Canada and then back to England via India, rounded South Africa and passed up the east side of the Atlantic.

> The completion of an "all-red" route for telegraphic, mail, passenger and freight services on the most modern lines has drawn the separated parts of the Empire together, has helped imperial trade, and has greatly increased the knowledge of each part of the Empire of the other.[12]

At the beginning of the 20th century messages from India to England were reduced to just a few hours, making communication between England and its colonies faster than ever before.

Another communication system significant for the development of economic, political and social changes were the railroad networks, developed throughout North America and Western European

---

[10] Misa, Thomas J. *Leonardo to the Internet: Technology & Culture from the Renaissance to the Present*. John Hopkins Press 2004. p. xii.

[11] Misa, Thomas J. *op cit*. p.108, note 10.

[12] Rose J. Holland, Newton A.P., Benians E.A. (eds). *The Cambridge History of the British Empire. Vol. 2. The Growth of the New Empire.* Cambridge: Cambridge University Press. 1929-1936. p. 713

countries. Enormous quantities of coal, iron and steel were needed for the creation and operation of these railroad systems, so these industries grew rapidly, together with the business structures of the countries, because for the development of these heavy industries a considerable amount of capital was required. Like telegraph networks, the railroad networks in a short time became another technological phenomenon to be part of the politics of control that the British Empire exercised over India. Before the First World War, through these technologies based on a network of communications, the entire world was connected.

Apart from the development of these technologies the telephone, the airplane, the automobile and the gramophone contributed to reinforce the inevitable transformation of the world into a place with countries no longer isolated from one another, but connected by the most recent advances of technology. The twentieth century was the first century where, in any part of the world, you could learn what was going on in any other part of the world almost immediately. These devices emerged in countries such as France, Germany and England, and to a lesser extent in the United States.

Although controversy surrounds who the inventor of the telephone was, two candidates usually vie with each other to be credited with this discovery, Alexander Graham Bell and Thomas Alba Edison. Innocenzo Manzetti had suggested an original development of the telephone in 1844, with his idea of a "speaking telegraph". By 1854 Charles Bourseul had created the Reis telephone, and in 1875 Bell set out his own project with patent number 161,739 of the United States with the title; "Transmitters and Receivers for Electric Telegraphs."[13] The following year, on March 10th, Bell's patent "Improvement in Telegraphy" enabled the first telephone transmission to be accomplished.

After several attempts to build a glider that could carry passengers such as George Cayley and Jean-Marie Le Bris in the 1850s, it was not until 1883 that the American John J. Montgomery achieved this. Parallel to this development, the Englishman John Stringfellow created the first aircraft, which successfully flew in 1848. In 1890 Clément Ader with three different machines managed to fly a self-powered aircraft. The first flew uncontrolled for a distance of 50 meters, the second in 1892 managed 200 meters, and the third in 1897 managed more than 300 meters. In 1903 the first controlled flight by the Wright Brothers took place in Kitty Hawk, North Carolina, and from then onwards, through flight, people were able to perceive the world from a different perspective.[14]

The 1870s in Germany saw the development of the automobile. Nicolaus August Otto and Gottlieb Daimler were the first to develop an engine run on gasoline. By 1885, Karl Benz was on the point of creating the first four-stroke cycle gasoline engine, and before all others gained the

---

[13] Bell Alexander. "Transmitters and Receivers for Electric Telegraphs." U.S. Patent number 161, 739. 1875
[14] Wegener, Peter P. *What makes Airplanes Fly: History, Science and Applications of Aerodynamics*. New York. Springer-Verlag Inc. 1997.

credit as the inventor of the modern automobile; by 1888, the product was beginning to be marketed.[15]

In November 1877 Edison announced the invention of a device able to record and replay sound; by the end of the same month he exhibited the device for the first time. He had worked on these ideas between May and July of the same year. He had based his work on the conviction that messages recorded by the telegraph could "play back", and that the sounds of speech being transmitted by telephone could be automatised. The phonograph underwent some improvements in the years following, and by 1887 Emile Berliner had patented the idea of the gramophone.

James Joyce and Virginia Woolf were observers of these developments. Both authors, born in the 1880s, lived in a society where communications developments took place in the first decades of the 20th century. Both authors to some extent wrote of their experiences and impressions of what modern life was like through the diffusion of these technologies.

The decade of the 1870s can be taken as the starting point of what is nowadays known as the second phase of the industrial revolution, ending by the beginning of the Great War in 1914. By this phase in Germany science and technology had begun to be applied to industry.

It was at this time that scientific knowledge was beginning to be thought of as at least as important as other factors of industrial production like capital, labour, and land. And it was this importance that occasioned new institutions in Germany by the end of the 19th century, with universities, government and industry, fostering research. In the United States this academisation of science took place some years later.[16] This was the starting point from which the electrical, steel, chemical and petroleum industries, and the corporate entities that managed them, were conceived. Britain, the first industrialised nation, was not significantly part of it.

The so-called second industrial revolution took place after 1870 when synthetic chemicals, refrigeration, electric light and other new industries, supported by the new technologies based on science, were developed. Due to new schemes of marketing, new consumers and product innovation, the new industries gave rise to the beginnings of a mass consumer society. At the same time the development of corporate industry took place, and a stronger relationship with the research carried out by universities and government agencies was established. Corporate industry and an economy sustained by science-based systems of production were two of the main structures transforming industrialised societies.

The goal of the technologists who worked in these new industries was no longer just to invent new products but to increase, stabilize and entrench the already established systems. This is the time

---

[15] Sinclair, Julie L.. *Great Inventions: The Automobile*. Minnesota. Capstone Press. 2004.
[16] Ross Stewart. *The Industrial Revolution*. London. Evans Brothers Limited. 2008. p. 50.

when technology took on its identity as an activity involving complex industry systems where a set of procedures based on science was achieved in an ever more complex industrial society. Germany was where this phenomenon first took place, particularly in the chemical industry, closely connected to university research, fundamental to the understanding of chemical structures and relationships.

> Also, several German chemists had the opportunity of learning industrial applications of organic chemistry when they went to work in England's dye factories, which benefited in turn from their scientific expertise. Returning to Germany, those chemists used the experience they had acquired by contributing to the birth and development of the first dyes plants built in their country, in the 1860s.[17]

It was in the 1860s (from 1861 to 1867) that in Germany four of the most important chemical companies were born, Bayer, Badishce Analin- & Soda-Fabrik (BASF), Hoechst, and Aktien-Gesellschaft Anilinfabrik (AGFA). These companies were mainly interested in the field of aniline dyes.[18]

The way in which science was established as an important field of knowledge for industry in Germany had not originally been thought of as support for industry. State universities had prepared their students mainly for professions having long traditions, government positions, and as secondary school teachers. The structures to prepare engineers and technicians were technical colleges which only by 1899 had acquired the privilege to give Phds degrees. In 1905 Germany had 10 of these technical colleagues, located mainly in the big industrial centres Munich, Berlin and Karlsruhe. Research institutes sponsored by the state was another element of the organisation of the science system of Germany. The institute of physics and technology was established in 1887, the institute of biology was established in 1905 and the institute of chemistry was established in 1911.[19] With these science-based technology and industrial systems, by the beginning of the 20th century Germany was a country fully immersed in the mass production that was increasingly responsible for the economic domination of the world.

The dyes industry stood out much more than other research areas such as electricity. Developments achieved by electrical manufacturers in Germany and the United States, based on patent strategies, were the ones achieving the consolidation of electrical corporations and the growth of research in this field.

Thomas Alva Edison, an example of a producer of original inventions, was a different kind of inventor from those people who achieved stabilizing inventions which were part of the system of production within the new industries.

---

[17] Aftalion Fred. *A History of the International Chemical Industry: From the "Early Days" to 2000*. Philadelphia. Chemical Heritage Foundation. 2001. p. 41.
[18] Aftalion Fred. *op cit*. p.41, note 17.
[19] Misa, Thomas J. *op cit*. p.131, note 10.

When Edison was working on his inventions, a nationwide telegraph system already existed in the United States. In 1876 in the New Jersey countryside, at Menlo Park, Edison finished his factory for inventions, in other words the first industrial research laboratory where technological devices such as the phonograph (1877) and systems of electrical distribution (1880) were created and patented.

> "I have it now!" he said, on Saturday, while vigorously turning the handle of a Ritchie inductive coil in his laboratory at Menlo Park; and singularly enough I have obtained it through an entirely different process than that from which scientific men have ever sought to secure it.[20]

By September 1882 Edison was switching on the Pearl Street station, New York, a system capable of generating electrical power and distributing it. Six years later, Edison already had six franchises for his company, distributed in Detroit, St. Paul, Chicago, New Orleans, Brooklyn and Philadelphia, and in Europe, in Milan and Berlin, this kind of station was also operating.[21]

It was in the second industrial revolution where engineering came to be seen as a profession. As Misa explains, before 1870 the professions of scientist and engineer did not exist, at least not as we think of them today. Before this year, engineers were mainly involved in 'military' and 'civil' work such as building bridges, canals, railways and fortifications.

By the first decades of the last century, the figure of the engineer had grown to be a person with multiple capacities such as conceiving, organizing, and directing industrial companies. Furthermore, engineers were considered to be men having a profound knowledge of natural laws, and who knew how to apply these laws for practical purposes.

The protagonists of *The Magic Mountain* and *The Man without Qualities* are individuals educated in a tradition based on the various above mentioned developments taking place in Germany. The figure of a scientist and of an engineer, on which both characters are based, is exactly the figure of the scientist and engineer pictured in the above descriptions, people who base their understanding of the world on what science is able to explain about natural phenomena. However, both books describe a time just before the beginning of the First World War, a period of instability where these same characters have to evaluate whether science-based technology is such a means of positive development as they had been led to believe.

2.1 *The Telegraph*

The history of telegraph and wireless technology cannot be told independently of the British Empire's developing politics of conquest in the Victorian era. In fact, the telegraph can be taken as

---

[20] 'The Electric Lighting.' Freeman's Journal and Daily Commercial Advertiser (Dublin, Ireland), Thursday, October 10, 1878; Issue N/A.
[21] Biographic. *Thomas Edison: life of an Electrifying Man* (Biography). Filiquarian Publishing. Biographic. 2008. pp. 16-18.

one of the strongest mediums of control and conquest that the government employed in its everyday efforts.

In 1900 there were many improvements in cable technology, not many for the physical cable but more focused on transmission techniques. For example, in the 1870s it was already possible to use a single cable simultaneously to send and receive information. The advances later achieved mainly improved transmissions as well as reducing the difficulties telegraph operators might meet with in their work. Telegraphs earlier on could transmit 9 to 13 words per minute, whereas by 1900 they could transmit 50 words per minute. And in the 1920s, with new improvements due to competition generated by wireless technology, telegraphs could send an average of 500 words per minute.[22] In the last decades of the nineteenth century the industry of cable manufacture became one of the most important.

With these developments, the British Empire from 1870 to 1914 controlled most of the world's underwater cables. This control signified a considerable economic advantage over other nations, providing faster and cheaper information via the telegraph, which was used by shippers. And it not only benefited shippers. Due to this control London became the world centre of trade and finance of import and export firms, as well as manufactures and tram steamers that constantly made use of the cables as their main system of communication.

As a global network of communications was already in use by the first decade of the 20th century, in subsequent years western culture will become familiar with the dimensions of the earth and especially with the map of the world. James Joyce and Virginia Woolf took part in this new spatial understanding. In the case of Joyce, at this time Ireland was still a British colony, and the idea of a map reflected in his narrative was part of the British archival knowledge of Ireland:

> First, the maps that Joyce used in the creation of *Ulysses* would have derived from the comprehensive British survey of Ireland taken during the early nineteenth century and thus would have represented Ireland through the spatial perspective of an imperial gaze.[23]

By being part of the British world, in the case of Joyce as part of a colony and in the case of Woolf as part of the British Empire, they had the chance to become familiar with concepts such as simultaneity and multiple points of view that were becoming social perspectives due to the new technological achievements of the British Empire.

The English were not the only contributors to this achievement, for the French government played an important role. By 1885 France was already linked with its West African colonies indirectly via the India Rubber, Gutta-Percha and Telegraph Works. Between 1890 and 1891 the

---

[22] Headrick Daniel. *Tentacles of Progress: Technology Transfer in the Age of Imperialism 1850-1940*. New York [etc]: Oxford University Press, 1988. p. 104.
[23] Hegglund, Jon. *"Ulysses" and the Rhetoric of Cartography*. Twentieth Century Literature. 49, 2. 2003. p. 165.

French managed to connect some Caribbean colonies and states like Martinique, Haiti, French and Dutch Guyana, and northern Brazil.[24] However, for communications from America to Europe, they still relied on English and American cables. By 1895 the French government could communicate to almost all its colonies, but the price it had to pay was high. They had to spend a great deal to pay for the services of the British cables.[25]

France was the only country able to set up a significant competition with the British Empire through its colonies and capital. At this point, France required independent communications with its colonies via the telegraph. By 1900 French newspapers were applying strong pressure by publishing articles asking the government to establish a French cable network, one which could communicate with the entire world.

For the creation of this network it was necessary to collaborate with other nations such as the United States, Germany and the Netherlands. It took three years for the *Compagnie francaise des cables télégraphiques*, from 1896 until 1898, to place a cable from the United States (New York) to the Dominican Republic (Puerto Plate). In 1899 France was finally connected to its Caribbean colonies by a French cable without any dependence on British companies.[26]

In 1905 a new cable was laid from Dakar, by that time the most important French naval base, to France. In 1912 a cable was set up passing through Conakry-Monrovia-Grand Bassam, and in 1913 another one crossing Libreville-Cap Lopez-Pointe-Noire. At the same time as that these connections were being made the French developed plans to acquire a cable going from Senegal (Dakar) to Brazil (Pernambuco). After a period of uncertainty, when it was unclear who owned the cable company rights, because it had earlier belonged partly to Brazil and partly to Britain, by 1914 the company owning the cable was a French one, the *Compagnie des câbles sud-américains*.

Just before the First World War started France did not have as many cables and lines as the English, although to communicate with America (North America, the Caribbean and Brazil) and with the Northwest region of Africa they were no longer dependent on British cables and companies, so contact with these places cost less.

2.2 *Wireless Technology*

Wireless telegraphy began to be conceived by James Clerk Maxwell in 1864 when he announced that electromagnetic waves existed and could travel in space. In 1887 the waves were produced in a laboratory by Heinrich Hertz, and in 1894, Guglielmo Marconi produced a device able to function as a producer and receiver of those waves.

---

[24] Headrick Daniel. *op cit*. pp. 111-112, note 22.
[25] Ibid. p. 112.
[26] Ibid. pp. 117-118.

By 1912 wireless technology was almost ready for use, and it matured in the interwar years. Wireless technology signified not only another way to communicate in addition to cable technology, but also signified another way to reinforce control over colonies that could be used by countries like Britain and France.

In the latter part of the 19th century the understanding of radio waves changed. It came to be seen as a natural phenomenon that could be used for communication purposes. In 1885 the first transmission from a distance of over two or perhaps three kilometres took place, achieved by Guglielmo Marconi. He patented his discovery one year later when he moved to Britain. From there, he started a series of experiments which quickly gave satisfactory results. By the year 1899 the first transmission across the channel had taken place, and by 1901 there was first radio transmission across the Atlantic, from England (Cornwall) to Canada (Newfoundland and Labrador).

> For his transatlantic experiment, Marconi decided to set up receiving equipment in Newfoundland. In December 1901, he set sail for St. John's, with a small stock of kites and balloons to keep a single wire aloft in stormy weather. A site was chosen on Signal Hill, and apparatus was set up in an abandoned military hospital. A cable was sent to Poldhu, requesting that the Morse letter S be transmitted continuously from 3:00 PM to 7:00 PM Cornwall time.[27]

Although the first Atlantic radio transmission occurred by the beginning of the 20th century, during the first decade the extension of wireless technology was limited mainly to ship-to-shore transmissions. In this period the telegraph was still considered as a more reliable, secure and economical communication technology. Wireless technology was still not used for long distance purposes, and it was very expensive.

At this time it was commonly believed that to achieve a transmission over longer distances necessitated the production of longer waves. It was impossible to imagine a transmitter of the required waves due to high costs of production. And even if the antennas could be created and the energy generated, still there was the fear of frequent breakdowns and static. So governments as well as private companies were not very confident about Marconi's new technology. However, Britain was not the only country researching this new technology, for other countries, more especially other inventors of other countries, were fascinated by the idea of improving the technology.

France was one of the nations interested in finding a way to improve wireless technology because of its empire's extension and its inability to communicate with it due to lack of cable lines. The government quickly became interested, and by 1904 the French navy had equipped some of its ships with the new technology.[28]

The war saw a great advance in radio-telegraphy communications. And due to the destruction of

---

[27] Sarkar Tapan K. *History of Wireless*. New Jersey. John Wiley and Sons Inc. 2006. p. 390.
[28] Headrick Daniel. *op cit*. p. 127, note 22.

communication networks, the wireless network came to be necessary for the global transfer of information. What in 1912 seemed hard to believe, in 1918 was already happening.

The research carried out at this time overcame some of the barriers that had previously seemed insurmountable and by the end of the war, via wireless technology it was already possible to connect places over 10,000 kilometers apart. To achieve this, two main innovations had to take place; the development of the high-frequency alternator and thermionic valves.

The high-frequency alternator was developed in the Unites States in the interwar years by General Electric, and also in France around 1918 by SFR.[29] Forest and Fleming developed the thermionic valves in the first decades of the 20th century and by 1925, the first long-wave telegraph station had started to function:

> A major project to use these new high-power transmitter valves was the construction by the Post Office in 1925 of the long-wave telegraph station at Rugby operating at a working frequency of only 16 kHz, whose call sign, GBR, was to become familiar to post office telegraphists at receiving stations all over the globe.[30]

The main differences between the old spark transmitters and these new devices had to do with the production of pure radio waves, and energy efficiency. The thermionic valve and the directional antenna were the two advances helping the shortwave to become the core of telecommunications discourse. Applying these two advances to shortwave technology, information could not only travel amazing distances, but the energy required was considerably less than before. A one-kilowatt transmitter was able to send messages 4,000 kilometres.[31] So in 1924 Britain decided to start the construction of a shortwave station for commercial communication purposes. To build one of these stations was considerably less expensive, something like ten times less, than to build a long wave station. Furthermore, the number of words per minute a shortwave station could transmit was almost 2.5 times more than the long wave station could transmit.[32]

Finally, after almost 50 years of continued reliance on British cables, France's development of wireless technology, and especially shortwave technology, enabled it to rid itself of British technological dominance.

Telegraph and wireless technology not only signified a worldwide communications network with colonies of the main 19th century empires; it also meant we could understand our world from a different dimension. In this new dimension, people around the world could learn what was going on elsewhere in the world almost immediately, it was just a matter of minutes to communicate with a city on the other side of the world. Telegraph and wireless technology were technologies reducing

---

[29] Ibid. p. 130.
[30] Beuchamp Ken. *History of Telegraphy*. London. The Institution of Engineering and Technology. 2008. p. 231.
[31] Headrick Daniel. *op cit*. p. 132, note 22.
[32] Ibid. p.132.

the time for communication with people who were in another part of the country and also in other countries around the world.

This novelty will be constantly reflected in the narratives of Virginia Woolf, a subject of the British Empire, and James Joyce, born in a colony (Ireland) of the British Empire until 1922, in the first decades of the 20th century. Both included in their narratives concepts such as simultaneity and multiple points of view, in part generated by this new understanding of the world that telegraph and wireless technology was generating. The global effects of these technologies enabled understanding of the actual dimensions of the world and the distances between continents; thanks to these technologies, it was possible to develop the map of the world, and to achieve a faster communication between countries, which by the second decade of the 20th century was almost immediate. However, in narrative, these technologies were partly responsible for new kinds of understanding. In a sense, they led to thinking about the simultaneous actions of various individuals taking place in different parts of a city, and to thinking about the perception of a situation not only by one character, but also by a variety of different characters, about the simultaneity of collective consciousness.

2.3 *Global Synchronization of Clocks and The Global Map of the World.*

From when the so-called system of triangulation for map-making was conceived, until the idea of mapping the entire world, several centuries had to pass. As will be see in this section, telegraph and wireless technology enabled us to achieve this. With the mapping of the world via telegraphy and wireless technology, ideas such as simultaneity and multiple points of view became concepts strongly influential in Western culture, developing in expressions of creativity in both science and the humanities.

The telegraph network led to the idea of the map of the world. Those built across the continents by the British Empire enabled understanding of a new perception of the world, the global map of the world. Furthermore, by the same period, the global synchronization of the world's time will define a geographical map or spatial map more accurately, and this map with the new global system of organization will also become a temporal map of the world.

The last two decades of the 19th century saw how the world acquired a universal time convention that started with the ideas of Sir Sandford Fleming in 1876. He proposed a time for the world of 24 hours with the Greenwich meridian as its original base, which was how the 0 degree longitude line was born. In 1884 at the International Meridian Conference, time zones were the temporal unit divisions Fleming presented, and these units little by little gained acceptance until the idea was accepted for the rest of the world. Soon afterwards the global division of time took place.

In the increasingly time-wired world of the early 1880s, time reformers campaigned for time unification on conflicting scales. Barnard, Fleming, and their allies pushed for a globe-covering "Terrestrial" time; the great national observatories of France, Britain, and the United States each advocated its own national time. Railroads and cities were the wild cards, much depended on the conventions they chose. Would cities conform to train time as they did in Britain and much of America? And if so, by what geography of simultaneity?...[33]

It was a long fight with various countries showing it was hard to swallow their pride, before accepting this convention for a better organization of the world. In the change from the 19th century to the 20th century, electromagnetic clock coordination was a global issue which appeared in philosophy and physics journals.

Time was a convention, an agreement like any other that would, depending on the accord, unify cities, lines, zones, countries, or the world. Inscribing that arbitrariness into the collective language was as great a transformation as the acquisition of a regularized time awareness.[34]

The purpose of synchronizing clocks had several advantages for the western world because at one level of organization, it provided an easier way to establish communications in real time from place to place within countries, from country to country within continents, and finally from continent to continent, especially communications between the most powerful regions of the world, Europe and North America. This synchronization would also implicate a timing map to assign a specific hour to each part of the world, a global time-space organization that the world underwent by the last decades of the 19th century. The timing map developed is one of the major features relevant to the first two chapters of this thesis, because this new organization permitted the authors of the age to reflect on the concepts of simultaneity and multiple points of view as a consequence of mapping the entire world.

The achievement required the effort of many people from different fields of knowledge to participate in its coordination. Physicists, engineers and also philosophers were in charge, and they had completed their work by the first decade of the 20th century. Why were Europe and North America so deeply interested in resolving this issue? Because it will help nations practically with improving the accuracy of train networks (to be more precise in the arrival times of trains in European train stations), communications between the United States and Europe, and create a more accurate perception of what the earth looked like, creating an entire map of the world. All these practical issues had a political side to them. In *Einstein's Clocks Poincaré's Maps* Peter Galison tells the history of this world synchronization, showing how people interacted to achieve it.

This book is about that clock-coordinating procedure. Simple as it seems, our subject, the coordination of clocks, is at once lofty abstraction and industrial concreteness. The materialization of simultaneity suffused a turn-of-the-century world very different from ours. It was a world where the highest reaches of theoretical physics stood hard by a fierce modern ambition to lay time-bearing cables over the whole of

---

33 Galison, Peter. *Einstein's Clocks Poincaré Maps: Empires of Time*. New York: Norton & Co., 2003. p. 122.
34   Galison P. op cit. p. 125, note 33.

the planet to choreograph trains and complete maps. It was a world where engineers, philosophers, and physicists rubbed shoulders; where the mayor of New York City discoursed on the conventionality of time, where the Emperor of Brazil waited by the ocean's edge for the telegraphic arrival of European time; and where two of the century's leading scientists, Albert Einstein and Henri Poincaré, put simultaneity at the crossroads of physics, philosophy, and technology.[35]

In Europe, cartography came to be one of the major scientific areas of research and in this process, trains and telegraphs were being the primary technological conceptions involved. The world was immersed in the rhetoric of mapping, not just for the knowledge that could be acquired spatially, but for the strongest nations of the world, it was also a contracted representation of power. The British legacy from the first 50 years of the 19th century bequeathed the conception that the spatial field marked the confines of the power of the empire; the geographical records represented the entire notion of this space, maps being the knowledge of the empire's territory.

> The imperial power thus recreates the empire in its maps, subsuming all individuals and places within the map's totalizing image. Military conquest, geographical conquest, and cultural conquest are functionally equivalent.[36]

The principal methodology for map-makers is that of triangulation, first implemented by the Dutch cartographer Gemma Frisius (1508-1555). By the beginning of the 19th century trigonometry applications on triangulation had given accuracy to map-making discourse. The precision that this mathematical concept gave to the cartographic studies provided the necessary credentials for becoming a scientific discipline.

> With triangulation, mapmaking was given the air of epistemological infallibility and scientific precision so central to establishing the modern cultural authority of the cartographic image.[37]

Although to map the entire world an aspect of mapping had still to be improved, the distances were becoming greater and greater, and to apply triangulation methodology one of the fundamental notions that had to be known was the distance between places. To know the distance between Paris and London, for example, was not an easy task, and even more difficult was the distance from New York to Paris. These distances could not be known taking into account the natural map provided by the stars, for the simple fact that the earth is rotating. So how was it possible to know the distance between two points a great distance from each other? Telegraph technology was about to provide the answer, and to revolutionize the way in which map making was done. As Galison indicated, we can understand the tremendous difficulties previously involved.

> Finding the longitude difference between two points is famously more difficult: it requires two distant observers to make astronomical measurements at the same time. If the earth did not rotate, there would be no problem: you and I would both look up and check which stars were directly under the North Star (for example). By checking a map of the stars we could easily find our relative longitudes. But of course the

---

35 Ibid. p. 14.

36 Edney, Matthew H. *Mapping an Empire: The Geographical Construction of British India, 1765-1843.* Chicago: University of Chicago Press. p. 24. 1997.

37 Hegglund, Jon. *op cit.* p. 169, note 23.

earth does turn, so to fix longitude differences accurately we must be sure that we are measuring the position of the overhead stars (or sun or planets) at the same time. For example, suppose a map-making team in North America knew the time in Paris and saw that at the team's location the sun rose exactly six hours later than it had in the City of Light. Since the earth takes 24 hours to rotate, the team would know that it was somewhere along a longitude line 6/24 (one-fourth or equivalently 90 degrees) of the way around the world to the west of Paris. But how could the explorers know what time it was back in Paris?[38]

The problem of longitude was transformed into a problem of timing events. If the cartographers took the time of a specific place and had chronometers with them, they could know the time of two places at the same moment. However, if an astronomical phenomenon is observed from both places, the accuracy of these two times would vary considering that the observer, in one part of the earth, is not observing exactly the same phenomenon as another who is on the other side of the world. This effect is produced because the path followed by the ray of light varies from one place to another, which makes the time the ray of light takes to arrive at a place on the earth differ considerably from another distant one. In the end, the chronology of events would be different, and the problem of what exact the time was in another country could not be solved.

An encounter between a new technological device and the world's need to be synchronized was about to take place. The 1870s and 1880s, decisive for the expansion of telegraph networks around the world, meant that by 1880 the continents of the world were connected by cooper British cables, and telegraph networks became a most decisive medium for the exercise of government power. The telegraph had developed sufficiently turn into the perfect tool to send signals from one place to another, and fix the accurate longitude between places.

If a signal was sent through a wire, then the time it took to arrive was almost immediate; transmission and reception occurred at the same moment, almost simultaneously. With this technological improvement applied to the science of mapping, the world was ready to be mapped.

> For hundreds of years, cartographers could only dream of being able to send a signal of simultaneity to fix longitude. The telegraph cracked the problem. Over vast distances, an electric current would race a signal through the wires so fast that the reception and transmission seemed practically instantaneous.[39]

It was a long passage from the application of triangulation on map-making until the moment humanity was able to think of mapping the entire world. The telegraph was a basic technological device for the achievement of this new conception of the world's lands.

> By 1884, the Bureau's [des longitude] principal activity was using observatory-based electrical time to map the world electrically. Indeed, for the whole period from the mid-1860s to the 1890s, France, Britain, and the United States raced to establish simultaneity over a sprawling network of undersea telegraph cables to fix longitudes and redraw the global map.[40]

By the same period there was another factor which helped completion of a map of the world,

---

38 Galison P. *op. cit*. p. 35, note 33.
39 Ibid. p. 103.
40 Ibid . p.129.

related to the synchronization of clocks. Parallel to the development of the world's spatial mapping, there was another, temporal mapping. In a sense, the map of the world from a temporal point of view was becoming as important for the relationships between countries as the spatial map of the world. Based on the concept of simultaneity, a spatio-temporal organization of the world was taking place, and the concepts of simultaneity and multiple points of view were at its core.

At the end of the 19th century, through these two world events together the world was mapped, at least, theoretically mapped. It took some time to organise the mapping perception of the entire world. However, the generation born in the 1880s lived in a world which had been completely mapped, and this had a major impact on the development of nations, as well as cultures. James Joyce and Virginia Woolf were concerned with the concepts of simultaneity, multiple points of view and maps, as part of the everyday lived experience of western culture, politics and economics, particularly of Europe and the United States.

The concept of simultaneity came to be acquired socially in part because of this mapping phenomenon. For the synchronization of the clocks of the world by the telegraph, and the mapping of the time zones, the concept of simultaneous events was required.

So far it has been seen why the emergence of telegraphy technology in the 19th century was fundamental for the mapping of the world and the conception of simultaneity. Before the next section there is just one final feature to mention, the role that wireless telegraphy technology had on the development of this electrical map and the inclusion of France in this world system.

At the beginning of the 20th century a global network of synchronized clocks was being established by wireless telegraphy, and the perception of space was changing. The world was experiencing not local times but a global feeling of simultaneity. The entire core of European thinkers were deeply engaged in the subject of time:

> Gathering in the Austrian capital to found a new anti-metaphysical philosophy, the physicists, sociologists, and philosophers of the Vienna Circle hailed synchronized clock simultaneity as an example of properly grounded knowledge that would stand proof against idle metaphysical speculation.[41]

The present was not a single regional sequence of events but a conglomeration of distant events. The contrast between sequence and simultaneity was reflected in the concerns of modernist artists and novelists, and could be materialized in the development of new technologies such as the telephone and the cinema.

The Eiffel tower—built between 1887 and 1889—was one of the cultural symbols of the era and not just for its architectural appeal, but because by 1909 it had become the main emitter of radio waves. By that time, Henri Poincaré, a recognised mathematician of the epoch, was the director of

---

41   Ibid. p. 25.

the French Bureau of Longitude (Bureau des Longitudes); a scientific institution in charge of astronomical observation, time-keeping, standardisation, geodesy and navigation. This was the institution which achieved the synchronization of the clocks and by the end of the first decade of the 20th century, one of its main concerns was to implant in the tower an electronic wave emitter for military purposes.

> ...in May 1908 the Bureau urged the establishment of a radio time signal from the Eiffel Tower that could be used to determine longitude anywhere the signal could be received. Backing from the army came easily. In the winter of 1908, the French government launched an interministerial commission to control the new radio technology, appointing Poincaré at its head.[42]

Poincaré's was the most significant pressure on the Chamber of Deputies for resources to use the Eiffel Tower as an emitter of waves that permitted the synchronization of clocks around the world. In July 1909, the Eiffel Tower became the greatest radio waves emitter in the world, and wireless telegraphy was to complete the electronic map of the world. In the coming years France also took the Greenwich meridian as a point of reference.

In 1912 wireless telegraphy, linked by ships and land stations, was used by many countries in the world as an essential means of communication. A worldwide network was finally achieved and a worldwide coordination of clocks, first conceived of a century before, was given concrete form.

It was the British cooper wires, the Eiffel Tower, and finally the American's Navy's radio transmitters, which by the first decades of the 20th century had covered the modern space-time map of the world. Not just technology and politics, but also science and mathematics and some areas of the humanities, contributed to a contemporary vision of time and space. The idea of simultaneity and the idea of multiple points of view were developed in several fields of knowledge, and were emerging due to the multiple visions that could be experienced from several parts of the world at the same time.

Two scientists, Einstein and Poincaré, are of primary importance to our understanding of how science and mathematics altered, and how later on, the concepts developed within their theories and technological achievements respectively also came to be applied in some ways in the narratives of some of the modernist authors. First, conceptions such as the map of the world and simultaneity were achieved in the ambit of science and a few years later, the same concepts were developed within the novel.

3. *Scientific Advances and Mathematical Improvements.*

One way to explain the parallel development of scientific and narrative ideas is to take into account a common conceptual ground. This is inherent in particular cultures of a given era. The

---

42   Ibid. p. 276.

science, mathematics and literature generated within a society draw ideas and concepts from this common conceptual background to develop their own areas of knowledge. Ideas prevalent in the culture of Germany, for example, were abstracted and later represented by the authors of the age as well as elaborated by its physicists. As will be seen in the following sections, the concepts of relative time and acausal events were at the core of cultural spatio-temporal reconsiderations that were reflected in the science of the time.

Just as with James Joyce and Virginia Woolf and the developments in British technology at the beginning of the 20th century, Mann and Musil were immersed in a society undergoing changes in its ideas due to scientific and technological changes. The aim of the next section is to show how two major novels of Thomas Mann and Robert Musil reflect a common cultural re-conceptualisation that was taking place with some of the most important ideas of the early 20th century, such as the relativity of time and acausality. This re-conceptualisation of particular notions of space and time was a cultural phenomenon of which different areas of knowledge, such as literature and science, were a part.

However, as will be seen in this section, this phenomenon is in a sense different from that of British literature, mainly because society's conception of science and technology after the First World War was different in Germany.

One of the main purposes of chapters 3 and 4 of this thesis is to show that the material embodied in *The Magic Mountain*[43] and *The Man Without Qualities*[44] provide a narrative description of some concepts that were at the core of scientific and mathematic discourse, and which at an epistemological level, were being redefined by the beginning of the century. In the case of Thomas Mann, it is not entirely clear whether the ideas of the mathematicians or the scientists of the time directly interact in the development of the narrative. In the case of Robert Musil on the other hand, he was well acquainted with the philosophy of science of the time.

Musil and Mann strongly interacted with the ideas of the philosophers as well as of the scientists of their epoch. One important figure that both authors read and wrote about was Oswald Spengler. *The Decline of the West*[45], first published in the summer of 1917, is an important book for the arguments presented in this section due especially to two notions. First, it provides a framework for the common origin of ideas, and this framework can describe the acquisition of narrative notions. Second, it is a linking passage to our understanding of how the development of the physics and the literature of the period interacted.

---

[43] Mann Thomas. *The Magic Mountain*. United States of America. Vintage Edition. 1996.
[44] Musil Robert. *The Man Without Qualities*. Great Britain. Picador. 1997.
[45] Spengler Oswald. *The Decline of the West*: *An Abridged Edition*. New York Oxford. Oxford University Press 1991.

Spengler's book had a profound impact on German society and on different fields of knowledge, in both the social sciences and in areas such as the epistemology of physics. It is particularly important for our understanding of the reception of these concepts by the greatest German authors of the period. As it could be seen in the section on British technological improvements, where the ideas of simultaneity and multiple points of view were becoming widely shared in the cultural atmosphere due in part to technological developments such as the telegraph, and where in France wireless development also contributed to making the same concepts part of the culture, in the case of German society the concepts of relativity of time and acausality will be concepts developed in part due not to technological developments but scientific ones, such as the Relativity Theory and Quantum Mechanics. For the recognition of these concepts by Mann and Musil, however, the figure of Spengler will be significant, and in chapters 3 and 4 the relationship between both authors and Spengler's ideas will be one of the themes dealt with. Both authors approached the scientific concepts with uncertainty, a consequence of the atmosphere in Germany after the war.

These authors also represented, in their main characters, the repercussions that the new cultural understanding of a relative time and acausal phenomena were having on the entire perception of human experience. With the concept of acausality, thinkable horizons were expanded and certainty over future events was made problematical. And with the concept of relative time, the duration of events turned out to be variable.

Musil and Mann took different positions on modern physics' concepts of space and time. In a sense Mann criticized the idea of science that time was a concept which could be measured, whereas Musil, while writing his last novel, underwent a process of assimilation of the difference between conceiving a world were causal events took place or conceiving a world where acausal events happen. Their main characters reflect a transitional period, a re-conceptualisation of their worldview due in part to the scientific innovations of the time. Although each of them reflect a particular perspective on science and mathematics decisive in the development of their novels, both drew on the ideas of decadence and uncertainty of Spengler's book. They both confront science and technology with a more pessimistic vision of the scope of these two areas within their narrative than the one Joyce and Woolf showed while they were getting to grips with new concepts of time and space.

3.1 *Einstein*

With the turn of the century the concepts of simultaneity and mapping were being reoriented by science and mathematics. Specifically, these two concepts acquired new meaning in the fields of theoretical physics and mathematics, respectively. Albert Einstein in Switzerland and Henri

Poincaré in France were the scientists who were working on these concepts and establishing ways of understanding their nature, which corresponded more accurately with natural phenomena and mathematical structures respectively. Einstein played a central role in the use of the concept of simultaneity, while Poincaré's work had an affinity with the concept of mapping and its potentiality for various branches of study.

Two of the most important ideas behind the special relativity theory not contemplated before Einstein are simultaneity and symmetry. I will now introduce these two concepts and show how they were used in the field of theoretical physics.

Symmetry refers to a mathematical object's characteristic. It is said that an object is symmetrical if a certain transformation is applied to it, and after this transformation has taken place, the object remains with the same structure. The concept of symmetry in mathematics had a considerable tradition, but for physics this was not the case. Einstein was one of the first physicists who used this concept in the development of a physical theory, relativity. His 1905 paper began to put forward that in contemporary electrodynamics theory, there was an asymmetric interpretation that in nature did not exist. He was searching for a theory where an absolute framework could be established, and this asymmetry did not allow this to happen.

The structure of our space is three-dimensional, as Euclid or Newton had assumed. The objects immersed in this space are capable of movement, and in a certain sense, of transformation. They can rotate, translate (moving only in just one direction) and reflect (as with a mirror). Abstractly, the structure of this space and its laws can also be part of these transformations and in certain cases, to maintain its symmetry, this means that the laws do not vary. Newton considered that time was apart from space, writing about it as another 'dimension'. In this perception the concept of time is also a symmetric one. However, when the physicists and mathematicians of the end of the 19th century studied the recently discovered laws of electricity and magnetism, they realized that the Newtonian view did not hold any longer. They understood that when a transformation was applied neither time nor space could be modified separately, both had to be modified together to a certain extent. Part of this phenomenon had to do with the inherent structure of Maxwell's equations. If the system was not moving this phenomenon could be ignored. However, electromagnetism does not produce the same phenomena when it is moving, for example, on a laboratory within a train, than one attached to the earth.

> Newton believed that no occurrence in the material world could affect the flow of time, but Einstein argued that the relative motion between an observer and an object makes the passage of time of the object appear to go more slowly than if it were observed from a point at rest with respect to it.[46]

---

[46] Kern Stephen. *op cit*. p. 33, note 1.

In this context, which object is moving mainly depends on the frame of reference taken into consideration, meaning that the motion is relative. Usually the frames of reference are chosen by the information they reveal concerning the phenomenon. In the case of Maxwell's equations not all the frames of reference revealed the same information. By the end of the 19th century, the idea of ether defined which frame of reference was best to be considered. The ether was thought of as remaining at rest, while light (which was treated as a wave) was moving through it, so the ether came to be an absolute point of reference. There was no explanation yet of why in different inertial frames Maxwell's equations behaved differently.

> Changing from one frame of reference to another is a symmetry operation on space-time. Inertial frames are about translational symmetries; rotating frames are about rotational symmetries. Saying that Newton's laws are the same in any inertial frame is to say that those laws are symmetric under translations at uniform speed. For some reason, Maxwell's equations do not have this property. That seems to suggest that some inertial frames are more inertial than others. And if any inertial frames are special, surely it should be those that are stationary relative to the aether.[47]

Two questions arose from these outcomes. Was it possible to detect motion relative to the ether, and which were Maxwell's equations symmetries? For the first question, in 1887, after building an experiment to detect the ether's flow, Albert Michelson and Edward Morley published an article in the '*American Journal of Science*' which concluded that the velocity difference between the movement of the earth and the ether was too small, in fact that it could be an experimental error for a value of zero. This result provided the intuition that perhaps the ether did not exist.

Einstein answered the other question. He found out that if symmetries were contemplated in Maxwell's equations, then a novel characteristic had to be taken into account; space and time had to be joined together in a continuum. He also found that a natural implication of these symmetries was that the ether velocity was zero. One of the most important results that emerged from this theory was that the velocity of light is an absolute; the framework where it is measured doesn't matter, the value does not change. Thus, if the velocity of light in any frame of reference does not change, then what has to change is the time that an object takes to travel from one point to another point in a spatial framework determined by a system of coordinates.

The impact Einstein's theory had on society, where an understanding of time and space as entities apart from each other was predominant, was not only significant in the area of physics but came to modify the significance of both concepts within western culture.

What the theory of Einstein established was that from there on both concepts had to be taken into consideration at the same time. Time and space were no longer two separated concepts but were tied together, and if human actions needed to be explained regarding space, then also time had to be considered and vice versa.

---

47   Stewart Ian. *Why Beauty is Truth? A Hisotry of Symmetry*. Basic Books 2007. p. 189.

Furthermore, the concepts of simultaneity and relativity also had to be considered because as will be seen in the paragraphs below, the idea of simultaneity was decisive for the recognition of the relativity of time. In subsequent years both concepts were addressed by western culture in different directions. Both the concepts and their relationship to time and space came to open up possibilities for the explanation of how events could happen. Chapters 1, 2 and 3 of this thesis will show how for example, the repercussions of Einstein's ideas on the narrative of the period, involved new forms to establish how events could be understood.

Einstein emphasized in the special theory of relativity that spatial and temporal coordinates vary according to relative motion. If an observer is in motion, he/she has no way to determine exactly simultaneous events, so simultaneity has no absolute status. Einstein's ideas on simultaneity came to revolutionize physical and philosophical positions on the frame of time and space. How things happened was not just a matter of equations and theoretical developments, but also had to do with a cultural environment.

In the physics of the very beginning of the 20th century to consider time, length or simultaneity implied dealing with their measurements in the contexts of electromagnetism and optics, but for Einstein, an emphasis on how these fundamental quantities were determined was needed.

> We have to take into account that all our judgements in which time plays a part are always judgements of *simultaneous events*. If, for instance, I say, "That the train arrives here at 7 o'clock," I mean something like this: "The pointing of the small hand of my watch to 7 and the arrival of the train are simultaneous events'."[48]

The major question constantly posed by Einstein was: What does it mean that two events happened simultaneously? How do we compare the arrival of a train in another city and the watch I am looking at in this precise moment? The answer relies on the coordination of clocks. The concept of simultaneity arises from the coordination of two clock systems, from their synchronization, and Einstein was aware of this, and when working at his patent office the telegraph system, as well as electric time transmission, were being developed. The activity of coordinating clocks was becoming a more substantial activity in societies, including public and private companies. As Galison wrote, in this period Einstein must have been thinking about the coordination of clocks:

> Einstein must also have had coordinated clocks in view while he was grappling with his 1905 paper, trying to understand the meaning of distant simultaneity. Indeed, across the street from his Bern patent office was the old train station, sporting a spectacular display of clocks coordinated within the station, along the tracks, and on its facade.[49]

This recognition of the synchronization of clocks as a requirement for defining simultaneity was

---

48   Allan Lightman. *The Discoveries*. Vintage Books. 2005. p. 73. Einstein's original article was published in 1905 in the *Annalen der Physik*. Albert Einstein (1905) "Zur Elektrodynamik bewegter Körper", Annalen der Physik 17: 891; English translation On the Electrodynamics of Moving Bodies by George Barker Jeffery and Wilfrid Perrett (1923); Another English translation On the Electrodynamics of Moving Bodies by Megh Nad Saha (1920).

49   Galison P. *op cit*. p. 30, note 33.

one of the most impressive aspects to be understood for the development of the special relativity theory.

In 1907 Einstein was arguing that the nature of light was not independent of the presence of the gravitational field, and travelled not in a linear way, but rather making a curve. With this theory, the concept of space had to be reconsidered because the shortest distance between two points is the one generated by a ray of light and thus, the space becomes curved. He also defined the nature of the gravitational field as a curvature due to the space-time continuum. The next year the German physicist Hermann Minkowski (1864-1909), proposed a unified space and time for a perception of events in a four-dimensional continuum where the coordinates are x, y, z, and t. A new framework to understand the development of events was conceived of eight years later when Einstein proposed to shift from an evolution of a three dimensional space to an existence of reality in a fourth dimension. In 1916 he published the first systematic exposition of the General Theory of Relativity[50], and the space-time continuum was born as theory.

In 1910, many of Einstein's colleagues were emphasizing the importance on the revision of the conception of time. Both physicists and philosophers were deeply perturbed by the synchronization of clocks and its consequences for modern thought in society. In 1914, Einstein accepted the revolution that the relativity of time meant for our concept of time, understanding that the new theory of relativity was a very controversial and disturbing result. By 1911, the Special Relativity Theory was generally accepted by the German scientific community, and between the year 1920 and 1922, there was a peak of publications of German books on relativity, although other countries were also making their contributions. In Germany, taking into account physics and popular publications, more than 120 books and booklets were published.[51]

In 1924 *The Magic Mountain* was published. Thomas Mann had started writing it in 1912, but due to the outbreak of war, the publication of the book was delayed and its main aim radically changed. It is primarily concerned with social events occurring before the war, but there is prominent interaction between science, mathematics and narrative. The concepts of time and space having already undergone a change in their very epistemological conception, Thomas Mann saw that science was aware of the problematic nature of the idea that time could be measured, and in his narrative he also strongly challenged it. Chapter 3 will outline the conception of time in the atmosphere of the book, and how this conception is related to some ideas present in Einstein's Relativity Theory.

The reception this theory had in the scientific community was as immense as the reception

---

[50] Einstein, Albert (1916), "Die Grundlage der allgemeinen Relativitätstheorie", Annalen der Physik 49.
[51] Kragh Helge. *Quantum Generations: A History of Physics in the Twentieth Century*. New Jersey. Princeton University Press. 1999. p. 100.

outside it. However, Relativity Theory came to be known to the general public only after the First World War was over. On May 29 1919 a solar eclipse took place and a group of scientists, particularly astronomers, went on an expedition to analyse some theoretical data from Einstein's theory that this eclipse might corroborate. Their experiment and the results obtained corroborated the accuracy of Einstein's theory. Much of this material was dedicated to discussion of its implications for non-scientific areas of study such as art theory and psychology, where it was generally misunderstood.

David C. Cassidy's *Einstein and Our World*[52] mentions that when Relativity Theory was diffused culturally, the effect it provoked in non-scientific fields of study was of reinterpretation, of an adaptation that the various fields of knowledge generated. He says:

> Some of these feelings found expression in cultural disciplines far beyond physics, and they were often reflective of reactions to relativity within the broader political culture. However, it is not the understanding of relativity theory, nor the lack thereof, nor feelings associated with either, that exerted the greatest impact outside of science, but the metaphorical "resonances" that Einstein's work elicited in the minds of "exalted spirits" in other disciplines, leading to new creative expressions of the human experience.

> One common theme that will emerge from the following overview of the impact on several disciplines is the preoccupation that relativity theory seemed to engender in every field regarding two fundamental notions: the concern for meaning in all facets of human experience, and the replacement of static processes and events by dynamic ones owing to a new preoccupation with the concept of time.[53]

Einstein's paper of 1905 caused a profound reconsideration especially of concepts hitherto considered as absolutes, relating to space, time, mass, and simultaneity. These concepts entered into a phase of physical but also philosophical reconstruction. This isolated event and its re-conception not only interfered with these previously held concepts, it occasioned a re-consideration of the meaning of other non-physical beliefs such as human destiny, and moral and values.

One of the philosophical movements which was connected with the growing acceptance of the Relativity Theory was the Vienna Circle. Moritz Schlick (1882-1936), a teacher at Vienna University who had studied physics under the supervision of Max Planck, was relatively close to Einstein and the physical ideas of the time. The Vienna Circle was particularly concerned with science and especially with Relativity Theory and later on, with Quantum Mechanics. One of the primary goals of the group was to clarify the relationship between nature and scientific meaning. In this process a bond between the Relativity Theory and the public was created:

> In essence, the Vienna Circle had come to the defense of science and relativity theory by retreating from the very activity that the public had for centuries demanded even more of philosophy than of physics: guidance on such metaphysical issues as systems of belief and virtuous behavior. By the crucial support that it rendered for relativity theory and physics as a discipline, the Circle had in a sense turned on itself,

---

[52] Cassidy, David C. *Einstein and Our World*. New York. Humanity Books. 2004.
[53] Cassidy D, *op. cit.* p.112, note 52.

and on philosophy in general, in the public eye.[54]

Apart from the philosophical interaction of Relativity Theory with the various philosophical currents of the time, there were areas such as arts and literature deeply concerned with the concept's repercussions, on the canvas as well as in narrative discourse. In the latter, the idea of the dilation or expansion of time was one of the new interpretations writers began to work with.

> Einstein's influence was so pervasive that it is important to dwell on his work, both for what writers like Musil, Joyce, and Faulkner did with it, and to understand how one can accurately compare Proust with Einstein. By imagining an observer on a moving train, and another outside the train, Einstein showed that they would have different temporal frameworks.[55]

In the case of *The Magic Mountain*, Thomas Mann will take his own stance on the concept of relative time, although his insights were developed taking into account both the artistic and the scientific aspects. As will be seen, Mann will counter the idea that the concept of time can be measured by human kind on his own terms.

3.2. *Poincaré*

Mapping.

In the history of mapmaking, one of the last great efforts was the completion of a map of the world. The history of this development is linked with Henri Poincaré in the ambit of mathematics, where he dealt with the concept of mapping.

There are three different topics with a common denominator relating to Poincaré's pursuit of knowledge. The concept of mapping is one of the ideas central to Poincaré's life in the scientific, mathematical and philosophy of science environment, and to emphasize his concerns here I will show three different developments that he produced in these areas, all directly related to the concept of the map. The so-called Poincaré Conjecture, the period of time he worked for the Bureau des Longitudes on mapping technology, and his 1902 book *Science and Hypothesis*[56] all deeply reflect his interest.

Henri Poincaré was a poly-phasetic scientist, a great mathematician and physicist who started his career as an engineer, and who also was involved in the philosophy of science. His studies mostly reflected a theoretical approach, although he was also interested in the practical and technological achievements of the period.

In the year 1878 the French Academy of Sciences made public a competition to improve some aspects of linear differential equations' theory. In 1880 Poincaré published an article on the

---

[54] Ibid. p. 116.
[55] Thiher Allen. *Fiction Refracts Science*. University of Missouri Press. 2005. p. 48.
[56] Poincaré Henri. *Science and Hypothesis*. Couvier Rover Publications, 1952.

connection between differential equations and a kind of complex variable function. In May of that year, after the publication of his essay, Poincaré understood that these functions were connected to non-Eucledian geometry in a very special sense. This was the beginning of a previously explored connection between topology and geometry in two dimensions that would be developed 20 years later. The results of the development of these ideas in a three-dimension perspective will become inherent to what nowadays is known as the Poincaré Conjecture.

At the beginning of the 1880s Poincaré contributed to the development of what previously had been called topology, a branch of mathematics, born in the 18th century with the works of Leonhard Euler. The German John Benedict Listing then coined the term "Topologie" in 1847.

As will be seen in the first chapter, James Joyce had a strong affinity with the discourse of cartography as a scientific activity. Henri Poincaré was important to Joyce while he was developing the last chapters of *Ulysses*. The discourse of mapping contained in Poincaré's theoretical framework is the one shown in *Science and Hypothesis*. Joyce mentioned some of these ideas in his notes, which is why it is important to outline the various areas from which Poincaré worked with the concept of maps and mapping, to understand how Poincaré conceived that different geometries could represent the same space, it was only a matter of choosing which geometry was more useful for the intended purposes.

Topology is the branch of mathematics which studies the properties of surfaces (and other mathematical structures). These properties can tell us of the homeomorphism between different surfaces. Two surfaces can be considered topologically equal if the distribution of points of one surface, when confronted with the distribution of points of the other, maintain a correspondence. The term homeomorphic is applied when two manifolds are topologically equal and the term homeomorphism is applied as a result of the equivalence from the one-to-one correspondence established by the two manifolds. The concept of manifold relating to surfaces can be interpreted with an example on mapmaking:

> This is important because mapmaking requires that we can determine how points are related to one another. We must be able to identify each. The maps, that is, the sheets on paper on which the points of the world are represented, are two-dimensional. A collection of maps that covers the surface, so that every point on the surface is represented on at least one of the maps, is called an atlas. If one purchases an atlas of the earth, one will get a book of maps, and one rightly expects that every location on earth appears in at least one of the maps. A two-dimensional manifold or surface, then, is an object represented by an atlas.[57]

At the turn of the century, Poincaré was working on the foundations of topology being especially interested in spherical topological properties. In 1904, Poincaré wrote a paper about what is nowadays known as the Poincaré Conjecture. The concept of two-dimensional manifolds can shape

---

57   O'Shea Donald. *The Poincaré Conjecture: In Search of the Shape of the Universe*. Penguin Books 2007. p. 22.

our world, but the concept of a three-dimensional manifold, although it will be not discussed here, can provide a model of the structure of the universe.

What we have to take into consideration with these developments is the conception of mapping which is behind the mathematical achievements of Poincaré. Both in technology and mathematics, at the turn of the century there was a strong interest in the concept of mapping and its repercussions for our understanding of the world reached several spheres of knowledge. Poincaré's main concern becomes clearer if we take into account the book for a public with a basic general education that he had published in 1902, *Science and Hypothesis*. Over the next ten years more than sixteen thousand copies were sold in France.

In Chapter 1 of this thesis the ideas of simultaneity, multiple points of view, and space developed by Henri Poincaré in his book, will be confronted with the same ideas that are reflected in the last episodes of Joyce's *Ulysses*. It will be seen that while Joyce was working on these last episodes he was in touch with some of Poincaré's ideas in *Science and Hypothesis*, which is why it is so important to emphasise the figure of Poincaré and his ideas on maps. The following section will deal with the notion of simultaneity in Poincaré's thought, which in a sense was another of the ideas that Joyce took into consideration while developing the last part of *Ulysses*.

Simultaneity.

From 1893 Henri Poincaré was a member of the Bureau of Longitude and his main purpose in this job was to synchronise the world's time and to map the world. In 1897, he took part in the supervision of the attempt to decimalise time and was a bridge figure between technology and science between the Academy of Sciences and the longitude mission to Ecuador. This longitude expedition lasted from 1899 until 1907, and in this period Poincaré was immersed in telegraphic technology, to send results to France. To map Quito had two major purposes, one for the map of the world and the other to determine the shape of the earth. Physics, philosophy and technology were taken together in Poincaré's thinking. He used to think of the synchronization of the world's clocks and its map as a human triumph.

Poincaré saw the possibilities the Eiffel Tower could provide for the sending of signals to synchronise time. As was mentioned above, from the beginning of the 20th century the Eiffel Tower was used to send electromagnetic waves. One of the main purposes of sending these waves was to achieve the world synchronization of time and Poincaré was the man who introduced the technology for that purpose. As a consequence of its role in modern technology, the Eiffel Tower came to be seen as the symbol of simultaneity: 'the Eiffel Tower owed its central role to its function as the radio-mast of Paris, the point at which global distances were nullified. It was the prime

symbol of simultaneity.'[58] Painters such as Robert Delaunay used it for his themes.
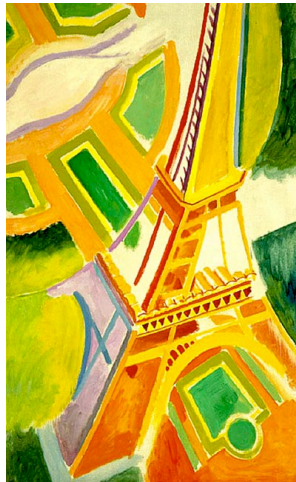
Robert Delaunay. Eiffel Tower, 1924.

Furthermore, due to the perspective from which Paris could be seen, the tower came to provide a novel idea of what a city looked like from above, and this new perspective ratified the idea that cartography had suggested on how space may be perceived.

The idea of simultaneity was a constant preoccupation for Poincaré. From this it can be seen that a concern with the nature of time and its relativistic aspect was born in his own scientific discourse, although these inquiries were just about to be revolutionised by Einstein:

> In 1898, he wrote a paper asking whether one second today is equal to one second tomorrow, and whether it is meaningful to say that two events in different places happen at the same time. He was heavily involved in working out the consequences of experiments which seemed to suggest that distances contracted in the direction of motion. In 1905, a then-obscure patent clerk, Albert Einstein, burst onto the scientific scene with four major papers, all recognized today as classics.[59]

Between the years 1902 and 1905 Central Europe underwent a coordination of time, the military, the railroads and the clock industry focused on time coordination as a major concern. Between 1904 and 1905 Einstein was constantly asking himself about the role of an observer in one place while another, distant, observed a train arriving at a specific time. The simultaneity of distant events was a key concept requiring to be defined to answer this question, and electric signals were the technology to do it.

At this time, Poincaré was also concerned with the concept of simultaneity. For him, it was a convention, an agreement between people, not a universal truth. In *Science and Hypothesis* he declared that '3. Not only have we no direct intuition of the equality of two periods, but we have not even direct intuition of the simultaneity of two events occurring in two different places. I have

---

[58] Information obtained from the website of MoMA (Museum of Modern Art, New York): http://www.moma.org/collection/details.php?theme_id=10068&section_id=T020544

59   O'Shea D. *op. cit*. p. 143, note 57.

explained this in an article entitled "Mesure du Temps.""[60]:

> What Poincaré asks, are the rules by which scientists judge simultaneity? What is simultaneity? His final, most forceful example turned on the determination of longitude. He began by noting that when sailors or geographers determine longitude, they must solve precisely the central problem of simultaneity that governed Poincaré's essay: they must, without being in Paris, calculate Parisian time.[61]

What we see here is the strong relationship in this period between mapping and simultaneity, and which was part of the redefinition of time and space. For mapping, map-makers had to ask what was the time in another place. Such a simple question had great consequences, which in the hands of Poincaré and Einstein was answered by establishing that if two events are simultaneous it is because the clocks in both parts are synchronised; simultaneity is about clock coordination. Peter Galison reminds us that:

> This is my quarry: how, at the turn of the century, was simultaneity actually produced? How did Poincaré and Einstein both come to think that simultaneity had to be defined in terms of conventional procedure for coordinating clocks by electromagnetic signals? Addressing these questions demands far too wide a scope to be captured by a biographical approach, though there are, to be sure, too many biographies of Einstein and not enough of Poincaré. Nor is this book a history of philosophical ideas of time, a task that could easily take us back before Aristotle. It is not a comprehensive account of the intricate development of timepieces, even electric ones. And it is not a complete history of the many broadly shared concepts of the nineteenth-century electrodynamics that Poincaré and Einstein appropriated as each struggled to reformulate the electrodynamics of moving bodies.[62]

The synchronisation of clocks was not fundamental but inherent to the development of the concept of simultaneity. The telegraph system of the late 19th century was one departure point for conceiving simultaneity, however; there was a mutual, reciprocal fulfilment between physics and philosophy creating technological innovations. The electromagnetic clock coordination was a techno-scientific innovation where lengths of cooper cables, as well as correcting map measures through simultaneity, were working together.

> The coordination of time in the half-century following 1860 simply does not sublimate in a slow, even-paced process from the technological field upward into the more rarified realms of science and philosophy. Nor did ideas of time synchronization originate in a pure realm of thought and then condense into the objects and actions of machines and factories. In its fluctuations back and forth between the abstract and the concrete, in its variegated scales, time coordination emerges in the volatile phase changes of critical opalescence.[63]

In May 1905 Einstein was working on the concept of simultaneity and its implications, based on the coordination of clocks by electromagnetic waves. As we can see, the concept of simultaneity already had a cultural tradition, which will finally collapse in his theory of relativity. This means that clock synchronization was a part of his philosophical concerns. In the end this concern was reflected in the development of the theory and can be noticed in the article that he wrote that year

---

[60] Poincaré Henri. *Science and Hypothesis*. p. 3, note 56.
[61] Galison P. *op. cit*. p. 34, note 33.
62   Ibid. p. 37.
63   Ibid. p. 40.

where the points' position was relative to measurement, although simultaneity can be seen as fundamental for the development of his theory.

In the technological environment, Poincaré was a key figure for the electronic map of the world. We already outlined some of the most important features of his participation in this global project. However, what we can understand of this fact is his constant preoccupation with the conceptualisation of a map.

3.3 *Acausality.*

The Austrian writer Robert Musil started work on his last novel *The Man Without Qualities* in 1921. He spent the next 20 years writing it, but was unable to finish it before he died, his wife finally carrying through its publication. As with *The Magic Mountain*, there are similar concerns about the social environment of pre-war Europe, with emphasis on a strong interaction between science, mathematics and literature, especially for the dilemma of causality. *The Man without Qualities* reflects both the causal and acausal positions which were at the core of discussions between the scientists of the age, especially those working in the field of Quantum Mechanics. The re-conceptualisation of scientific and mathematic ideas which took place in German culture from 1910 to 1930 -as shown by scholars like Paul Forman[64]- was not entirely limited to contemporary scientists; it was a process involving other areas, in which the philosophy of time, such as Spengler's, was important. One of the following sections of the introduction will be focused on this theme.

One hundred and fifty years ago, a debate began about a nature that could be described by laws, and one that couldn't. Approaching the beginning of the 20th century, a more epistemological dialogue and diverse opinions from several fields of knowledge such as the social sciences, as well as the natural sciences, enriched the debate. Statistics also started to be used to describe certain microscopic natural phenomena, one of the most contradictory fields concerning natural determinism. By the early 20th century, concepts such as the laws of nature, causality, indeterminacy and determinism were some of the main ideas involved in a re-configuration of how we understand the world. The article *"Legge e caso alle origini della fisica contemporanea"*[65] gives a concise treatment of the development of these ideas.

At the beginning of the twentieth century a new description of natural knowledge was beginning to appear. Hitherto this description had been ruled by the mechanistic perspective, the principle of

---

[64] Forman Paul. *op cit.* note 3.

[65] Zanarini Gianni. *Legge e caso alle origini della fisica contemporane, Published in La Fisica nella Scuola, XXVII (1194),* pp. 155-160.

causality, and the linear succession of events. The change of perspective occurred due to a crisis in experimental as well as in theoretical physics, where some concepts had to be re-thought to make sense of the results of new experiments and theory. These concepts did not change through the efforts of the physics community alone, but other factors like the philosophy of the time, and the role of institutions, patronage and the state, played a fundamental role in promoting the recent ideas of the physicists.

The physicists of the 19th century were convinced that nature could be fully understood. Germany was the centre of modern physics, and the two most recognized physicists were Hermann Ludwig von Helmholtz (1821-1894) and Gustav Kirchhoff (1824-1887). By the end of the nineteenth century Max Planck (1858-1947), who studied with Helmholtz and Kirchhoff, was the most prominent young theoretical physicist and was eager to consolidate a physical worldview quite separate from the already consolidated but problematic mechanical worldview. Philosophers likewise, who were also trying to establish a worldview different from the one believed in by mechanistic physicists, informed the German intellectual *Zeitgeist*. Hitherto, scientists had followed a two centuries long material-mechanistic tradition grounded on a positivistic philosophy, whereas the philosophers of the time were putting forward an antimaterialist-monistic worldview.

In 1886 Wilhelm Wien (1864-1928) proposed a formula to describe the energy distribution of blackbody radiation. His model contained faults in the description of long wavelengths of blackbody radiation, and after some years and the intervention of other physicists, his results reached the hands of Max Planck. Planck proposed a model that included the long wavelengths and presented it in October 1900 to the Physical Society. The result was a new mathematical proposition of the blackbody radiation phenomenon, a theory which was now grounded on an electromagnetic, thermodynamic-energy worldview, as well as on the mechanical one. This means that by the turn of the century, when Thomas Mann and Robert Musil were 25 and 20 years old respectively, physics' framework was about to change. Both authors were not young enough to be part of an educational system that could introduce these modern theories. Nevertheless both of them in the 1920s could understand and include in their narrative some of the implications that these new theories, which as will be seen came to be known as Relativity Theory and Quantum Mechanics, had in their own perception of the world.

For some time the above mentioned theoretical frameworks kept Planck's theory ignored, because experimentally the formula was used but theoretically it was not until Albert Einstein saw the philosophical implications, that the theory became part of modern theoretical research, and a new worldview emerged. The physics crisis was based in part on Planck's results and its philosophical implications, which later on were shaped by Albert Einstein. Planck's mathematical

proposition was the beginning of a conceptual reconsideration of the principle of causality. Quantum Mechanics was the theoretical framework in which Planck's results were developed, and which suggested a reconsideration of the worldview. It has been strongly argued that this new worldview was not entirely modelled by physics' theories, but also Germany's *zeitgeist* at the beginning of the 20th century. This aspect will be developed later on.

The origins of indeterminacy and acausality, as has been shown by Paul A. Hanle in his article *'Indeterminacy before Heisenberg: The Case of Franz Exner and Erwin Schrödinger'*[66], can be tracked to the first decade of the 20th Century. As Hanle writes in the first part of his article:

> I shall discuss Exner's and Schrödinger's advocacy before the advent of quantum mechanics of the fundamental indeterminacy of natural law. Theirs was an interesting though premature version of the principle, born shortly after the turn of the century out of positivist-monist ideology and nurtured in the anticausal environment of Weimar German physics. It was premature in the sense that it had little ultimate effect on quantum mechanics.[67]

In his inaugural address, the Austrian physicist Franz S. Exner (1849-1926), who in 1908 became the rector of the University of Vienna, spoke about a world division on two non-common bases. This division, carried out by scientists and humanists, was on the one hand continuous and lawful and on the other hand, discrete and random. Perhaps this address was a first allusion to the phenomena of indeterminacy and acausality. Hanle's article brought out Exner's thinking.

> To Exner, a discontinuity between the kinds of phenomena of the world is non-existent; the difference is only "gradual." In fact, all laws are approximate. Laws do not exist in nature but are formulated by man: "He makes use of them as verbal or calculative expedients and thereby wishes only to say that the processes in nature take their course as if matter, like a rational being, obeyed these laws." Yet the experience of physicists seems to contradict this view of universal inexactness. So far as it can be determined, macroscopic physical laws hold exactly.[68]

Exner's ideas were not taken into consideration until in 1922 Schrödinger mentioned them in his inaugural lecture as a theoretical physics professor at Zurich University. Even by that time, Exner had not been recognized as a pioneer, perhaps, as Hanle remarked, due the "speculative character of his ideas".[69] Nevertheless:

> Even if there is no evidence that Exner's views on fundamental indeterminacy influenced the research on Bohr, Born, Heisenberg, and the other physicists who created quantum mechanics, his ideas impressed Schrödinger who also contributed to that research. And they added to the anti-causal sentiments in German culture of the Weimar period, which directed physical thinking toward acausality and its embodiment in quantum mechanics.[70]

This early recognition of concepts such as discrete and random within natural phenomena reflects the atmosphere that was being generated within Austro-German culture, in which Robert

---

[66] Paul A. Hanle. *Indeterminacy before Heisenberg: The Case of Franz Exner and Erwin Schrödinger*. Hist. St. Phys. Sci., 10 (1979).
[67] Hanle Paul , *op. cit.* p. 226, note 66.
[68] Ibid. p. 237.
[69] Ibid. p. 254.
[70] Ibid. p. 269.

Musil lived and worked. From 1911 until 1914 he worked as a librarian for the Technical University of Vienna. In this period he started work on the play *Die Schwärmer* (*The Enthusiasts*), which as will be seen in chapter 4 was a work in which Musil had started to recognize the acausality of events.

By the summer of 1918 Germany was on the point of victory in the war, but the autumn of the same year brought absolute defeat. Mainly due to this disaster and its aftermath, for German culture the intrinsic value of science was challenged, with the public no longer having faith in it, and rationality itself compromised. Scientists themselves were reorienting their philosophical scientific bases such as the aim of science, its positivism, and the justification or using science to develop weapons. After the First World War "…the Weimar academic world was a neo-romantic, existentialist "philosophy of life", revelling in crises and characterized by antagonism toward analytical rationality generally and toward the exact sciences and their technical applications particularly".[71] Paradoxically, these are some of the most fruitful years for the development of modern physics' theoretical ideas.

A reorientation of the convictions of German physicists regarding the principle of causality took place. However, this reorientation was not entirely motivated by the theoretical results of physics itself, but also by the socio-cultural environment. From 1905 till 1918 the old Quantum Theory was being developed, and the social environment after the First World War gave a more accurate direction to this development, especially to the mathematical insights supporting the theory.

For some historians, an antipositivism and an important rejection of causality characterised the period. The so-called *Lebensphilosophie* was strongly opposed to mechanistic approaches, determinism, rationalism and formalism.

Physics was not the only area of study immersed in a crisis, there was an overall feeling of cultural crisis, from politics and economics to science and education. In this crisis environment *The Decline of the West* came to represent what German society was feeling about its own culture: a deep pessimism, belief in the sunset of humanity. Spengler had never aimed to give in to a pessimistic view, although this view was what was perceived by society.

3.3.1. *The Decline of the West*

It is important to outline some of Spengler's most significant ideas, which by the 1920s were so strongly influential in Germany, and indeed all Europe. Attention will be focused on three main themes in his book: culture, and the role that mathematics, and what he calls 'symbols', play within it. Spengler's ideas informed German culture's idea of life and human development, and this

---

[71]Forman P, *op. cit.* p. 4, note 3.

perception is crucial in connecting the scientific and mathematical concepts of the age with its literature.

Culture.

He develops a theory of what a culture is. From the very beginning of his book, he clarifies his idea on culture and its relationship to entities within that culture.

> "…we must first be clear as to what culture is, what its relations are to visible history, to life, to soul, to nature, to intellect, what the forms of its manifestation are and how far these forms—peoples, tongues and epochs, battles and ideas, states and gods, arts and craft-works, science, laws, economic types and world-ideas, great men and great events—may be accepted and pointed to as symbols."[72]

For him, mathematics, physics, painting and sculpture, are all examples of the self-expression of a particular culture, composed of dogmas, arts, sciences etc., and depends profoundly on its symbolic conception of space and time.

Any culture, whether Chinese, Western, Mayan, etc., passes through a childhood, youth, manhood and old age, just like men or women. And it is only in mature cultures that a mechanical conception of nature and the recognition of time are developed. For example, Spengler explains that Hellenic physics was grounded in static perspectives, whereas Faustian culture (this is what he calls western culture, in homage to Goethe) was grounded in a dynamic one. The main difference between these two cultures is their recognition of time. Through this recognition their development of fields of knowledge such as physics and mathematics radically changed. For him, simultaneity, multiple points of view, relativity of time and acausality, are all concepts that could be developed only in a mature culture. The next four chapters focus on how these cultural ideas, space and time elements, were developed in the arts, particularly in narratives of the second decade of the 20th century.

The First World War came to demonstrate the collapse of cultures, and led to change, touching on various ideas of Western culture. The word crisis, a valuable concept due to its capacity to include several areas of knowledge, is frequently used by Spengler. Crisis in art, science, economics, philosophy, and other areas, occurred simultaneously.[73] One of the phenomena generated in this environment was an overall need to redefine the concepts undergoing an epistemological crisis, leading to their eventual re-conceptualisation.

This pessimism of the culture, the sense of crisis, is much more evident in the thoughts and beliefs Mann and Musil reflect in their novels. In our last two chapters, this pessimism and uncertainty will be brought out. Much of this departure point for both authors in dealing with

---

[72] Spengler O. *op cit*. p. 4, note 45.
[73] Ibid. p. 37.

science and science-based technology could be ascribed to the defeat of Germany in the First World War. Using *The Magic Mountain* and *The Man without Qualities* as examples, it will be clear that the German literature generated after 1918 was one where the feelings of pessimism and denial of the value of past scientific and technological developments, felt to have brought Germany to defeat in the war, are a main theme for the characters as well as for the atmosphere of the narrative. Chapters 3 and 4 will show how both Mann and Musil made use of their reading of *The Decline of the West*.

For Spengler, a writer works under constraints exactly in the same way as a researcher is. Here, instead of the experimental analysis being directed at nature—just as is done in science —it is directed at human feelings, becoming a reflection of the social environment. Both authors reflect the scope of human feelings in their narrative, and in this they include the ideas of the relativity of time and acausality.

The research of a particular age is dependant upon the cultural environment in which researchers are born and grow up. Even if they are able to detach themselves from prejudices, at the moment their minds are absorbed by a problem, their own thoughts -marked by a specific school and tradition- will control the course of their decisions about the phenomenon analyzed. They will examine nature given the impression of the world that their own culture provides. For example, Newton, with the use he gave to the words "force" and "motion", was manifesting an idea of Faustian culture about the world. The interpretation of the multiple interactions of masses occurring in an infinite space as time goes by, relates to their motion and the forces involved.

From that time, physics' concept of natural phenomena concerns the prediction of events for a future time, causality. But the physicists were not the only ones to adopt the idea of causality, the entire Western culture developed its ideas within the framework of causal events. However, due to the recent achievements of the beginning of the 20th century western civilisation's notion of time and causality was changing. Mann and Musil were sensitive to the cultural concepts of the epoch, also embedded in the mathematical and physical discourse of the time. They both give to those concepts a particular interpretation developed as a consequence of the German cultural environment, which was permeated by a constant feeling of decadence and uncertainty.

Mathematics

For Spengler the word and the number are the starting points from which a culture may generate concepts and ideas. They are our basic elements to confront the world, symbols able to provide us with understanding its characteristics. We are used to thinking of the development of ideas as isolated events occurring within a particular area of knowledge, and which are in no sense related to

other areas. Spengler favoured the opposite process, in which ideas are part of a whole culture, and then are developed in fields of knowledge and represented according to their own schemes. In this sense, concepts undergo an appropriation from a cultural context to a more specific environment. For example, the concept of the infinite developed by western culture was first conceived in the conception of the nature of number and was then represented in other areas such as science, arts and literature.

In Spengler's opinion the mathematics of a culture is intrinsically linked to its arts. As will be seen in chapter 3 in the analysis of the concept of time, Thomas Mann takes a similar position concerning how both arts and sciences can be used to understand a concept such as time. Both are useful to denote some of the characteristics of a cultural concept. For Spengler a cultural concept is manifested in a variety of areas of creativity such as arts and sciences, for the patterns used to express their ideas are the same for both artists and mathematicians. These patterns are directly related to the period's awareness when painters, composers, etc. interpret and shape this perception in their own work.

> The sense of form of the sculptor, the painter, the composer, is essentially mathematical in its nature. The same inspired ordering of an infinite world which manifested itself in the geometrical analysis and projective geometry of the seventeenth century, could vivify, energize and suffuse contemporary music with the harmony that it developed out of the art of thorough-bass (which is the geometry of the sound-world) and contemporary painting with the principle of perspective (the felt geometry of the space world that only the West knows).[74]

As Spengler is developing this conception, we can see in contemporary literature the same awareness, the same immersion of patterns within their narratives, for example in Mann's case the notion of infinite space is used in his narrative, and in Musil's, the causal-acausal dilemma is repeatedly considered. As will be seen in chapters 3 and 4, Mann and Musil made use of ideas common to the physics of the period, where the idea of a relative time and acausal events were at the core of scientific discussion.

The mathematical understanding of a culture is inherent, to an equal extent, in technique development and the arts of a culture. Regarding the idea of number generated in a culture Spengler compares the classical idea of number with the western idea. For him, both are supported by different epistemological bases. One of the main differences regards the concept of the infinite, which does not belong to the classical framework and is inherent in western number; the number line becoming an infinite hive of numbers.

In the work of Mann, from time to time he spoke about the infinite, referring to it as an important concept from the Middle Ages to the Renaissance., but what should be pointed out in Mann is the passage from the scientific understanding of number to its understanding in daily life, from

---

[74] Ibid. p. 45.

mathematics to personal experience. He could show the infinite as part of our everyday life, of the social environment, the same repetition of events could create an unending day, an infinite day. This is one of the ideas set out in chapter 3.

Mathematics is a language of forms able to grasp this enigmatic world. The best chance cultures had, and still have, of interpreting it is with the creation of symbols. Symbols of space, time and things, which are included in the representation of numbers, are also included within the representation of arts. In western culture, physics has interpreted the space of the universe as infinite, and mathematics since Descartes has striven to understand this symbol. Spengler was not on his own in his redefinition of space, time and the role of the infinite in them. As has been seen, as a consequence of technological and scientific developments, society felt the repercussions for conceptions of time and space from the new ideas deeply.

Symbol

To Spengler, symbols are the prime elements of every culture. These symbols are created by the culture and transferred to human expression areas such as the arts and mathematics. For Spengler, a symbol is a collective result from the interaction between human beings and nature. A symbol is an attribute of facts, which has a meaning for people and responds to an idea, an idea based on nature. As the world is assimilated individually, there are as many worlds as creatures, and the interaction of these creatures, the relationships established between them, provide a shared intelligibility of the world. This intelligibility takes shaped in the manifestations of the culture, its language, arts, religion, science, mathematics, etc. And they are the way we make sense of the world. Every culture has its own manifestations, its own interpretation of the world.

> SYMBOLS are sensible signs, final, indivisible and, above all, unsought impressions of definite meaning. A symbol is a trait of actuality that for the sensuously alert man has an immediate and inwardly sure significance, and that is incommunicable by process of reason.[75]

The prime symbol of a culture impresses the 'style of every life-expression' on it, represented in its religion, mathematics, science, art, music, etc. Every symbol of a culture can express the prime symbol not directly, not necessarily in an easily understandable form, but in a subconscious way. Its meaning can only be interpreted by its own culture. In *The Magic Mountain*, Mann will create an environment such as the entire landscape covered in snow, to make his main character Hans Castorp experience the sensation of an infinite space.

The idea of "experience" was developed by Spengler's Faustian (i.e. western) culture and in no other, implying a dynamic view of the world. It cannot be recognized in any other culture not because of an inaccurate interpretation of the facts, but because the conception of causality is

---

[75] Ibid. p. 87.

missing. Experience is linked to our understanding of past, present and future, and not to a mere static or timeless instant. It is also attached to inductive reasoning, from the particular to the infinite.

Spengler did not single out literature as a creative field, expressing culture. Yet following Spengler's ideas literature may also be contemplated as part of a culture where a constant interaction with other domains of knowledge takes place. In literature, as happens with art or music, mathematics and science, the concepts and the symbols of the culture are represented, via the narration. The following four chapters are all concerned with how novelists writing in the second and third decades of the 20th century, were interpreting concepts which Spengler would take as symbols of Western culture.

To some extent the ideas in N. Katherine Hayles' *The Cosmic Web,*[76] when she writes of the "field concept", may be taken as a more recent interpretation of Spengler's ideas above. The "field concept" may be considered as the background of a culture where ideas are generated to explain the world. The "field concept" is a model that can sketch the relationships between narrative strategies, used by the authors of a specific culture, and the development of the scientific and mathematic models of the same age. The metaphor Hayles used in her description of the world for the "field concept", is what she calls "the cosmic web", like a spider's web, formed by conceptualisations that may or may not correspond to reality.

> The prey the cosmic web is designed to entrap is the dynamic, holistic reality implied by the field concept. But the prey always escapes, precisely because the web is articulated; as we shall see, to speak is to create, or presuppose, the separation between subject and object that the reality would deny. What is captured by the cosmic web is thus not the elusive whole, but the observer who would speak that whole. Hence the cosmic web is inherently paradoxical, deriving its deepest meaning from a whole that it can neither contain nor express.[77]

Spengler's symbols and Hales' "field concept" are models enabling us to grasp a common origin in the conceptualisation of ideas, both speaking about the generation of ideas within the culture and then embraced by areas of knowledge.

> Whereas the scientific theories are created through the attempt to express the field view in rigorously exact models, the literary strategies are forged by the desire to find a form, and a language, adequate to interpret its human meaning.[78]

Ideas and concepts were reshaped from cultural understanding in specific areas of knowledge. The conception of time of physics, and the narrative time developed in *The Magic Mountain*, as well as the conversion from causality to acausality in physics and Musil's conceptualisation of this transmission, have a common origin in German culture. Both space-time continuum and acausality

---

[76] Hayles N. Katherine. *The Cosmic Web: Scientific Field Models and Literary Strategies in the Twentieth Century.* Ithaca and London. Cornell University Press. 1984
[77] Hayles N , *op. cit.* p. 21, note 76.
[78] Ibid. p. 59.

are the symbols behind our analysis of physics, mathematics and literature.

3.3.2. *Spengler and Quantum Mechanics*

In this section the environment of the crisis in physics will be outlined, and then our attention will be focused on the German writers who, as part of society, were also part of these changes and were able to abstract the ideas in their works. As will be seen, the ideas of the physicists were modified by the milieu; the path followed for the new conceptualisations was not directed either by experimental or theoretical results, but in part by the social circumstances of the scientific communities.

For Spengler, a clear symptom of decadence, of our being in the last period of western culture, was that European physics had reached the limit of its possibilities. The physicists doubted concepts that for the past two hundred years had been the basis of its development. The meaning of space, absolute time, mass, the principle of energy and causality, were no longer grounded in secure epistemological bases.

> We see, then, that the causality-principle, in the form in which it is self-evidently necessary for us—the agreed basis of truth for our mathematics, physics and philosophy—is a Western and, more strictly speaking, a Baroque phenomenon. It cannot be proved, for every proof set forth in a Western language and every experiment conducted by a Western mind presupposes itself.[79]

Spengler's ideas reflect the thinking in educated German society. Science provided a knowledge, but this knowledge was unacceptable because of what had happened in the war, where science and its technical applications had led to the direst sufferings in society. As a result of this social understanding of science, scientists had to modify their causal conceptions for acceptance by German culture, no longer receptive to a positivist vision of science, and searching for other interpretation. The concept of acausality was one new way to interpret natural events, more in accordance with the beliefs of post-war German society.

It is well known that Spengler was read by some of the most important physicists of the period such as Albert Einstein, Max Born, Richard von Mises, Hermann Weyl or Wilhelm Wien.[80] It is possible to think of a cultural crisis becoming a scientific crisis when physicists interpreted their results according to the social environment that was evolving in the Germany of the 1920's, where an anti-positivist attitude towards scientific discourse, of its fundamental concepts of causality and determinism, was taking shape.[81]

Before the introduction of Quantum Mechanics' theory, the physicists had already experienced a crisis in their working conceptions. By the beginning of this decade, the most prominent German

---

[79] Forman P. *op cit*. p.198, note 3.
[80] Ibid. p. 56.
[81] Ibid. p. 61.

physicists were deeply engaged with the word "crisis".[82] Mechanics, physics, causality concepts, and theoretical physics, were just some of the concepts and areas of knowledge according to the physicists were in crisis. The idea of acausality as explained Spengler was affecting the way physicists thought, and threatening their previous convictions about causality. From 1921 till 1928 a more accurate description of an acausality process emerged, and although in general German physicists were not promoting "the lawlike definiteness of the physical processes"[83], as Sommerfeld has it, it seems they embraced acausal Quantum Mechanics for an improved public image.

The hostile environment and the re-adaptation of the ideology of physics to society was one of the characteristics of the milieu. The *Lebensphilosophie* was partly concentrated in Spengler's book, which some physicists read. For this re-adaptation, Spengler was one of the only philosophical standard bearers that could be used by physicists to recover a positive public image they had enjoyed before and during the First World War.

4. *The Perception of Time and Space in Modernist Literature.*

What were the main effects that the inclusion of scientific and technological concepts in culture caused in literature? This section does not attempt to answer this question directly. What it will do is reconstruct the main features that gave a direction to topics such as time and space, themes of the modernist writers.

In 19th and early 20th century literature there was an evident interest in science and technology.[84] After the 1860s, authors as different as Jules Verne, Edwin Abbott Abbott, H.G. Wells and Joseph Conrad were developing their narrative taking into account technological, mathematical and scientific themes. However, the beginning of the twentieth century may be considered a phase when a more epistemological introduction of concepts, of these fields of knowledge within literature, occurred.

The cultural movement where these changes in literature occurred is known as Modernism. Peter Childs and Roger Fowler define Modernism as follows:

> Modernist art is, in most critical usage, reckoned to be the art of what Harold Rosenburg calls 'the tradition of the new'. It is experimental, formally complex, elliptical, contains elements of decreation as well as creation, and tends to associate notions of the artist's freedom from realism, materialism, traditional genre and form, with notions of cultural apocalypse and disaster.[85]

And they go on to define the core of this modernist art, to be found in the literature of the writers below:

---

[82] Ibid. p. 62.
[83] Ibid. p. 108.
[84] Otis Laura. *Literature and Science in the Nineteenth Century: An Anthology*. Oxford. Oxford University Press. 2002.
[85] Childs Peter and Fowler Roger. *The Routledge Dictionary of Literary Terms*. Abingdon. Routledge. 2006. p.45.

The best focus remains a body of major writers (James, Conrad, Proust, Mann, Gide, Kafka, Svevo, Joyce, Musil, Faulkner in fiction; Strindberg, Pirandello, Wedekind, Brecht in drama; Mallarmé, Yeats, Eliot, Pound, Rilke, Apollinaire, Stevens in poetry) whose works are aesthetically radical, contain striking technical innovation, emphasize spatial or 'fugal' as opposed to chronological form, tend towards ironic modes, and involve a certain 'dehumanization of art' (Ortega y Gasset).[86]

Due to these characteristics, intrinsic to the structure of the narrative, a significant change from previous literature took place. A. Alvarez has also pointed out that if we are looking for Modernist literature, we should search for it in the first three decades of the 20th century, when writers like Joyce, Kafka, Eliot, and Pound were its central figures.[87] Peter Gay listed Proust, Woolf, Mann, Joyce and James as fundamental figures in the movement.[88] Both these last two critics are conscious that the whole of modernist literature cannot be entirely described by their personal selection, although their simplification is useful.

Joyce, Woolf, Mann and Musil used the concepts of simultaneity, multiple points of view, relativity and acausality, which form part of our contemporary understanding of time and space. From Modernist literature the themes I am interested in outlining are the most important for an understanding of the major changes and developments in narrative theory allowing James Joyce, Virginia Woolf, Thomas Mann, and Robert Musil to capture the concepts of simultaneity, multiple points of view, relativity and acausality.

In the first three decades of the 20th century the themes which underwent a transition and in which I am interested the most regarding the prose of these authors are: to a lesser extent, the language and the place of the novel in relation to society, and to a greater extent the modern conception of time and space, the interaction of science and technology with literature, and the communication it generated.

The modernist writers understood that language had unknown horizons never explored before. They understood that grammatical structures could be deformed, and that the relationship between words and things should not slavishly follow already established techniques.

The so-called crisis of language was not an isolated phenomenon, it was a crisis emerging from a cultural crisis. The modernist artists could not be unaffected by the influence of their contemporary environment. Europe in the first decades of the 20th century was immersed in a cultural crisis because of the political and economic events taking place, what has been known as the language crisis was just another facet of it.

The turn of the century made writers reflect on crisis, on ends and beginnings, and on cycles. The fin-de-siècle deeply affected artists and led them even to reflect on their own medium of

---

[86] Childs Peter and Fowler Roger. *op cit*. p.45, note 85.

[87] In *Modernism: A guide to European Literature 1890-1930*. Edited by Malcolm Bradbury and James McFarlane. Penguin Books 1976. p. 32.

[88] Gay Peter. *Modernism: The Lure of Heresy*. William Heinemann 2007. p. 194.

expression, language. Of course this language crisis was reflected in how the modern novel came to be written.

What this crisis of language provoked was the exploration of new forms of explanation, of narrative. Due to this crisis within modernist literature, either consciously or unconsciously, four main themes were developed. From now on within the narrative character's states of consciousness, a complexity of the prose and the lack of plot were to feature. There was also a radically new characteristic:

> One of the great themes of the Modernist novel has been, in fact, the theme of the art of the novel itself: a theme that, by forcing the reader to pass beyond the reported content of the novel, and enter into its form, has given Modernist fiction a dominantly Symbolist character.[89]

In the works of writers like Woolf and Joyce, there are clear components of a French symbolist legacy. However, one of the main differences was the lack of a linear sequence of acts as well as the lack of a continuous narrative. What the crisis of language generated was the ability of writers to embrace hesitation, rumination, states of dream and of conflict. In the end, they were able to capture new aspects of the human mind, which without crisis could never have been accomplished.

One of the deepest concerns of modernist authors was the concept of time and the concept of space. The four chapters of the thesis are about the relationship between authors and time and space. I will speak about these concepts in the novels of Joyce, Woolf, Mann and Musil.

At the beginning of the 20th century the concept of time was being questioned, an example of this being Joseph Conrad's *The Secret Agent* (1907). The subject of the book revolves around the destruction of that prime symbol of global time, the Greenwich Observatory.

> "Ah! Here it is. Bomb in Greenwich Park. There isn't much so far. Half-past eleven. Foggy morning. Effects of explosion felt as far as Romney Road and Park Place. Enormous hole in the ground under a tree filled with smashed roots and broken branches. All round fragments of a man's body blown to pieces. That's all. The rest's mere newspaper gup. No doubt a wicked attempt to blow up the Observatory, they say. H'm. That's hardly credible."[90]

From then onwards, a concern of modernist authors to represent the nature of time emerged. One of the elements by which the authors will support their perceptions—either consciously or unconsciously— was a novel technological achievement of the age, the cinema. Cinema technology and what humans could now see, went together with developments some writers such as Proust were beginning to express in their novels. Proust elaborated the idea of a 'three-dimensional psychology' instead of a 'two-dimensional psychology'. Julia Kristeva writes this about Proust's *A la recherché*:

---

[89]   Fletcher John and Bradbury Malcolm. *The Introverted Novel*. In *Modernism: A guide to European Literature 1890-1930*. Edited by Malcolm Bradbury and James McFarlane. Penguin Books 1976. p. 396.
[90] Conrad, Joseph. *The Secret Agent*. Digisreads.com Publishing. 2007. p. 34.

As it restores my various, different, relationships with people and things, my memory fastens upon particular 'sites' and 'places'. But, incapable of placing them in succession to one another, it sets up 'revolutions' around me as it does around them. In order to take account of this assembly of 'revolutions', the book would have to use '*not the two-dimensional psychology* which we normally use but a quite different sort of *three-dimensional psychology*' (III. 1087).[91]

This idea emerged in an attempt to include the notion of time within the life of the characters. Proust was convinced that narrative up until then had had the same characteristics as a plane geometry, and what he wanted to achieve instead was a 'geometry' where time and space could be narrated together, achieving the perception of the experience of the flux of time. A contemporary who also contributed to an understanding of the experience of the flux of time was the French philosopher Henri Bergson, with his concept of dureé.

Concerning space, writers made radical departures in their ways dealing with it. On the one hand they became as precise as possible while framing instants, spending much more time on describing simple actions such as a kiss or a handshake. On the other hand, they collapsed spatial actions, such as the death of principal characters, into very few words.

> For one thing, modernist novelists dramatically reversed the customary allocation of space, devoting extensive passages to a single gesture or disposing of a protagonist in less than a sentence. In the opening volume of *A la recherche du temps perdu*, Marcel Proust takes two full pages to analyze M. Swann's first kiss with Odette, the courtesan he will eventually marry; in Virgina Woolf's *To the Lighthouse* (1927), one of her two supreme works of art—*Mrs Dalloway* is the other—we learn of Mrs. Ramsay's death, the true protagonist of the novel, in passing, literally in a parenthesis.[92]

Another specific case is at the very beginning of *The Man without Qualities*, where the description of the day, of the spatial atmosphere, is described as precisely as possible by using scientific and technological terms.

 The literary texts of the 19th century saw the rise of literary naturalism. In *A Dictionary of Literary Terms and Literary Theory* this term is defined as follows:

> naturalism …Properly speaking, it should be used to describe works of literature which use realistic methods and subjects to convey a philosophical form of naturalism; that is, a belief that everything that exists is a part of nature and can be explained by natural and material causes – and not by supernatural, spiritual or paranormal causes.[93]

 However, before the end of this century these perceptions will start to change, and with the turn of the century the depth of this alteration can be seen, partly but not exclusively because science, the source of the trend, also underwent a radical revision of its bases. However, as will be seen, an engineering perception will remain an option.

New concepts in science more and more took on the nature of poetic conceits; the crucial advances in

---

[91] Kristeva Julia. 'Proust and Time Embodied.' In *Marcel Proust.* Broomall, PA. Chelsea House Publishing. 2004. p. 32

92 Gay Peter. *Modernism: The Lure of Heresy*. op cit. p. 184, note 88.

[93] Cuddon John Anthony and Preston Claire. *A Dictionary of Literary Terms and Literary Theory*. Oxford. Blackwell Publisherd Ltd. 1998, p. 537.

science (not merely in the relatively new field of psychology but also in the more traditional physical sciences) followed the exploitation of the same kind of imaginative, intuitive insight that went towards the making of a poem. The physicist found himself having to acknowledge the existence of new and disturbingly different laws, in which controversial logic and common sense played a greatly diminished role.[94]

The attitude of contemporary scientists was hesitant over explanations of natural phenomena, and writers adopted the same attitude over human experience. In modernist narrative we can find considerations of physics' concepts such as the relativity of time and the quantum mechanics' principle of uncertainty, the science of the beginning of the 20th century brought the possibility of adopting a variety of explicative points of view and perceptions of a particular event, without losing reality or being subjective in its treatment.

Science and technology became inherent in the modern discourse of narrative, useful to develop new techniques and systems of representation. In the theme of technology and narrative the cinema was a fundamental technological innovation, used by writers as a tool to confront the representation of time and space in literature.

> Baudelaire, Proust, and Joyce pursue an art focused on shocks, which the new cinematic art extensively develops as one of its formal principles... they are all fascinated with the technology of switching, inserting, and pressing characteristics of the photograph, the friction match (i.e., lucifer), the newspaper, the phone, and the mechanization of the crowd. Each of these elements surfaces during various incidents in Joyce's *Ulysses*: mediations on photography and photographs, Bloom's lighting of a match, the movement of trams through the city, the production of newspapers, the dialling and ringing of telephones, and the mechanization of people's movement through a modern city (especially in the eleventh episode, 'Wandering Rocks').[95]

This closeness that writers developed to technological innovations had an effect on their conception of the novel. For some, the novel became a literary machine whose purpose was to abstract nature. The novel came to be seen as a field of study, where a mechanistic approach towards nature was recognized. Joseph Conrad, Paul Valéry and James Joyce had various ideas on the mechanization of their novels.

> The notion that the literary work (or, at least, the contemporary literary work) is a machine becomes a recurrent feature in the work of many late nineteenth- and twentieth-century writers. Joseph Conrad, for example, spoke frequently about his work and its relation to the mechanics of nature, and he described his novel Nostromo as being a literary machine. Valéry's mediation on Leonardo, architecture, and on engineering and poetry all demonstrate this preoccupation with mechanization accompanied by the tendency to view the creative work as machine. Joyce described *Finnegans Wake* as a work of engineering and himself as an engineer.[96]

With the recognition of this mechanization it was possible to include science and technology as a part of this knowledge. Modernist literature felt nothing should be excluded from literature, that

---

94   McFarlane James. *The Mind of Modernism*. In *Modernism: A guide to European Literature 1890-1930*. Edited by Malcolm Bradbury and James McFarlane. Penguin Books 1976. p. 84.
95 Theall Donald F. *Beyond the Word: Reconstructing Sense in the Joyce Era of Technology, Culture, and Communication*. University Press of Toronto. 1995. p. 66.
96   Theall D. *op cit*. p. 36, note 95.

there was no field of knowledge which literature could not include in its treatment of human experience. Poets and writers became engineers of their artistic products, the poem came to be seen as the result of an assembling elaboration, a piece of engineering, just like an automobile or an airplane. The poet as engineer used bits of information as primary material, the unit pieces from which the novel was constituted. In his article "Tradition and the Individual" T.S. Eliot recognizes a poet perhaps not so much as an engineer but as a chemist, who creates new poetry by a process of 'transmutation of emotion':

> The analogy was that of the catalyst. When the two gases previously mentioned are mixed in the presence of a filament of platinum, they form sulphurous acid. This combination takes place only if the platinum is present; nevertheless the newly formed acid contains no trace of platinum, and the platinum itself is apparently unaffected: has remained inert, neutral, and unchanged. The mind of the poet is the shred of platinum. It may partly or exclusively operate upon the experience of the man himself; but, the more perfect the artist, the more completely separate in him will be the man who suffers and the mind which creates; the more perfectly will the mind digest and transmute the passions which are its material.[97]

Although Eliot is referring to the poet more as a chemist than an engineer, the analogy reveals how artists were using the recently accepted social figures of scientists and engineers as figures of comparison for what the artists were trying to achieve in their works; writers and poets were to words what scientists and engineers were to theories and structures.

Technology also brought with it another feature for writers to think about, the concept of distance. Developments such as cinema and the telephone gave a new sense of spatial perception and the writers included this in their novels. In the past, science fiction had dealt with the reduction of distances, but this phenomenon was no longer simply fictional, it was an aspect of reality and was deeply altering human perception. Communications had changed, and the world was getting used to it very rapidly. From the publication of Verne's science-fiction work to Proust's first volume of *À la Recherche du Temps Perdu*, only forty years passed. In this period the way humankind moved from one place to another or established communication with others in cities, countries and continents, radically changed. Before dealing with modern communications, as our last aspect of modern literature, there is still one issue I would like to mention: the imaginary experiment.

The imaginary experiment developed by the fiction writers of these years was another characteristic of the modernist narrative. The writers used prose as a vehicle for literary experimentation, which seems to go together with the same epistemological ground to which a scientific experiment belongs, using text to experiment just as scientists do with a scientific experiment. In this context, texts are experiments proving language assumptions, but not only language, they also tested fields of knowledge such as science.

I want to make the point here that, since Joyce and Kafka, the notion of experiment is accurate to describe

---

[97] Eliot T.S. "Tradition and the Individual Talent." In *Selected Essay*. London. Faber & Faber. 1976. p. 18

the way some fiction tests science, and may challenge notions grounded in scientific beliefs about the real by experimenting with their implications.[98]

What in science is known as a thought experiment refers to the process of abstraction where objective conditions such as its velocity are imagined, and then a specific experiment performed. The results obtained may have specific implications for natural phenomena. It is a process of taking nature to its edges and then seeing what would happen beyond those limits. Since the Enlightenment imaginary experiments had been used to create scientific theories and even to reach out to philosophical implications. The most famous imaginary scientific examples are the experiments proposed by Albert Einstein in the first decades of the 20th century, where he imagined objects travelling near the velocity of the light.

In literature, as in science, a similar phenomenon occurred. The imaginary experiment is a logical construction of words grounded in conjectural bases for our understanding of possible implications. This strategy can be seen in the field of narrative, in a long tradition because used since the Renaissance, and even nowadays, is still part of narrative discourse. The capacity of these experiments to embrace consequences deriving from logical relations is why writers found it so useful and indeed decisive in the elaboration of their own stories. Writers who used imaginary experiments either consciously or unconsciously were Joyce, Borges, Calvino and Queneau.

One of the most radical features that modernist narrative challenged was human communications. With technological developments of the epoch such as the phonograph and the photograph, writers could imagine where processes of communication such as production, distribution and reproduction of these artefacts, would end.

The end of the 19th century saw these processes begin, and the first three decades of the 20th century saw their maturation. Imaginary experiments were applied to this medium of communication, and from 1880 to 1960 the arts were concerned with the potential consequences of technological improvements.

In the first half of the 20th century the cinema became one of the most important preoccupations of artists, especially writers (even though some of them, like Joyce and Eliot, did not accept the fact that communication technologies were invading and becoming deeply embedded in their narrative discourse). Technology came to create a new mode of communication, and modern writers grew with this new perception of the world.

> Just as earlier people became at one with the ways their universe of signs developed through writing, signing, signalling, singing, dancing, and drawing, moderns are becoming at one with their electronic networks. Those networks become extensions of the nervous system, as they merge in a symbiotic relation with that nervous system. In both the pre-modern and modern instances, the means and modes of

---

98   Thiher Allen. *op cit*. p. 214, note 55.

communication and people form a continuum.[99]

In the previous sections, the development of some of the communication technologies round about the turn of the century have been outlined. Their development was crucial for modernist narratives, with writers like Joyce, Woolf, Mann and Musil, reflecting their thoughts and experiences in their narrative.

In the 1880s, a decade of global changes for the perception of time and space, writers like James Joyce and Virginia Woolf were born. The interaction of the scientific-technological developments and the culture of the milieu, where the British Empire used science-based technology as a media to achieve their communication objectives, created an atmosphere where the conceptions of time and space underwent a re-definition.

> Telegraphy allowed the Victorians to think about space and time in new ways. For a writer at the start of the twenty-first century, the apparent newness of the 'world wide web' may obscure the extent to which the Victorians had created a global communications network; thinking of the telegraph as the 'Victorian Internet' partially redresses the balance, though at the risk of obscuring the different power interests which created the two media.[100]

The past, present, and future, distance and communications, were concepts affected by these developments and writers like Woolf and Joyce gave shape to these changes in their narrative. Time and space were not just confronted with a unique transformation, but as has been seen there were many ways in which these two concepts underwent redefinition and writers were cultural pioneers in expressing these new perspectives.

As will be seen in the first two chapters, both writers will reflect an attitude towards science and technology much more in accordance with the positive attitude the British Empire adopted regarding these topics as modes of development. On the other hand, the attitude of German writers like Mann and Musil, whose cultural situation, where the science and technology after the First World War came to be seen from a more pessimistic perspective, will indicate a different attitude to science and technology, and different perceptions of time and space, and chapters 3 and 4 will focus on these themes.

It is difficult to point towards particular causes for the re-conceptualisation of time and space, although features such as railroads' schedule requirements, which provoked a World Standard Time, and technological inventions such as the telephone, introducing previously unknown perceptions, are definitely relevant.

If time and space changed, the way to communicate also changed, and Joyce and Woolf will be shown in the next two chapters, to reflect these changes in their narrative not only as receivers but

---

[99]   Theall D. *op. cit*. p. 224, note 95.
[100] Whitworth Michael. *Einstein's Wake: Relativity, Metaphor and Modern Literature*. Oxford. Oxford University Press. 2001. p. 171.

also as contributors to new ways of perception, both writes being able to reunite the concepts of simultaneity, multiple points of view and maps in one single idea to give a more realistic vision of the events in their narratives.

Clocks before the 19th century did not have minute hands and the transmission of time by speed of sound was not even conceivable. The history of mapping intersects with the concept of simultaneity, originating in the last years of the 19th century, and gives rise to a new perception of space that will be noticed in the concerns of the novelists of the epoch.

Poincaré and Einstein were not the only people thinking about simultaneity, for all over the world people were thinking about the nature of electromagnetic signals and its reaching different points. Railroad planners, train schedules, telegraph operators and the people who were shaping the world were concerned with the same topic. While Einstein was in the Bern patent office the coordination of signals by radio waves was being prepared.

As we can see, the concept of simultaneity was at a crossroads of multiple fields of knowledge with science, technology and philosophy involved. The origin of the concept of simultaneity cannot be regarded as originating in one specific place, time or field of knowledge, but we can see that the concept is related to the coordination of global time. Maps and simultaneity were united by this coordination of global time.

In the ambit of science, Einstein and Poincaré, were independently incorporating the relativity principle to the sphere of physics. As can be seen the age when Virginia Woolf and James Joyce were born is exactly the age where the mapping of the entire world took place. This means that when they were born the world was changing drastically, the technology was already there when they wrote their books. And even though these events happened years before James Joyce published *Ulysses* and Virginia Woolf's publications of the 1920s, and in different countries, these world events were affecting the entire notion of time and space, simultaneity, mapping and viewpoints. By the moment both authors wrote their texts, these concepts were being totally acquired, due in part to the positivist vision of the British Empire regarding science-based technology, and by European culture.

James Joyce and Virginia Woolf were deeply interested in the concept of space and time which were revolutionized by the beginning of the 20th century. Concerning these phenomena, three particular concepts were being developed in their narratives, mapping, multiple points of view and simultaneity. However, what then these two authors achieved, thinking of these three concepts as a unit, was a deeper kind of perception previously unimagined. The first two chapters will describe the period when these two authors recognised the phenomena and joined them together to create the most modern conception of time and space within the narrative.

Mann and Musil also pictured a change in the ideas of time and space and represented them within their novels. However, the perception of both writers of scientific concepts went more in accordance with a German cultural environment, which had a pessimistic vision about science-based technology and its repercussions for humanity. Chapters 3 and 4 to some extent will be concerned to show this awareness, that this pessimistic perception was developed due to defeat in the First World War.

Thomas Mann started writing *The Magic Mountain* on 1912 but had to wait until the end of the war to conclude it. The war made him change and redirect the concepts he was planning to work with. Robert Musil began to write his novel in 1921 and after being involved in the war, came back to finish its first two parts.

The concept of acausality was shaped before the 20's and while it was changing, the concept of time was conceived as a non-linear phenomenon. In Mann's book the conception of time is developed within a framework where Relativity Theory as well as the space-time continuum are taken into account. As will be shown in chapter 3, Thomas Mann developed several experiences for his characters where the measurement of time was dealt with. In Musil's novel we will find a complementary vision of how the concept of acausality was applied to narrative. Chapter 4 will show how Musil was in contact with the ideas of scientists such as Ernst Mach, and that from the notions he acquired from him, he developed in his narrative a continuous confrontation between causal and acausal events.

Musil and Mann had some knowledge in the fields of science and mathematics, Mann with an early academic formation focused on engineering, and Musil with a degree in engineering. However they did not have the scientific equipment to interpret the current developments, although as will be seen in chapters 3 and 4, they were assisted by Oswald Spengler and his ideas in *The Decline of the West*, read by both while writing their novels, enabling them to consider the concepts of a relative time and acausal events respectively as part of the most important cultural concepts of the period. To some extent the German cultural milieu[101] also had repercussions on the feelings of pessimism and uncertainty towards science and technology that both authors adopted as part of their particular interpretations of time and events happening within space.

At the beginning of the last century, temporality was a concept developed by various areas of science such as biology, geology, physics, and subjects such as entropy and energy. This conception allowed thermodynamics to give a certain direction to processes, to give a history able to speak of

---

[101] An overview of the Weimar Culture can be found in Peter's Gay book *Weimar Culture: The outsider as insider*. London. Martin Secker & Warburg Limited. 1969. This is a sketch of Weimar culture and the different conflicts and dilemmas of German society in areas such as politics, academic life, poetry, architecture, arts and literature. However, for this essay we are considering the intellectuals' accomplishments and ideas as part of the society, and not as outside of it.

past events and of the evolution in the experiments. The word "evolution", was starting to be part of daily discourse.[102]

 The modernist writers were immersed in a culture permeated by scientific and mathematical ideas, one of them being the non-Euclidean geometry, and having specific repercussions; it opened up a landscape to consider any theory or model an optional tool to develop certain conception of the world.

> All three [hyperbolic, elliptical, and Euclidean geometry] are intended to give us the laws of space. And it cannot be the case that what Euclidean geometry tells us about space is true at the same time that what elliptical or hyperbolic geometry tells us about space is true.

> The notion of what geometry tells us about space, though, is certainly far form clear. Suppose one considers both Euclidean and hyperbolic geometry to be uninterpreted systems. It is easy to find—indeed, the relative consistency proofs tell us how to find—a geometrical interpretation that is perfectly consistent with Euclidean geometry. If we can find in the world straight lines and such, as Euclidean geometry describes them, we can also find straight lines as elliptical geometry describes them: we can find them on the surfaces of spheres.[103]

Writers who developed the consciousness and implications of Non-Euclidean geometry toward science were James Joyce and Marcel Proust, contemporaries of Duhem, Mach and Poincaré. The assimilation of non-Euclidian geometry in society was conceived as an expansion of the landscape, of human horizons. In the end, what Non-Euclidean theory provided was the awareness that one specific model among several describes our space; that this notion was a particular possibility of description.

> This moment when models cease to be regarded as intrinsic to the phenomena is perhaps the moment when modernity in science and, concomitantly, in literature begins.[104]

Culture underwent a change with the inclusion of Non-Euclidean geometry, and consequently narrative. Not just with the introduction of Non-Euclidean geometry, but with the innovation over several areas of physics and biology, in genetics, thermodynamics, field theory, Quantum Mechanics, and Special Relativity Theory. All these developments took place before the First World War and all had repercussions on the framework of the modernist writers. Although Mann and Musil (born in 1875 and in 1880 respectively) were not educated in these fields of modern knowledge, as will be seen in chapters 3 and 4 they were able to grasp particular notions of the Relativity Theory and Quantum Mechanics.

> One should keep in mind, moreover, that neither relativity theory nor quantum mechanics could be part of an educated person's cultural assumptions before World War I, and that their import had thus to be absorbed by modernists writers at the same time that they were being assimilated by the scientific

---

[102] Thiher Allen. *op cit*. p. 34, note 55.

[103] Hausman Alan, *Non-Euclidean geometry and relative consistency proofs*. In *Motion and Time, Space and Matter: Interrelations in the History of Philosophy and Science*. Edited by Peter K. Machamer and Robert G. Turnbull. Ohio State University Press. 1976. p. 426.

[104] Thiher A, *op. cit.* p. 38, note 55.

community. The epistemological implications of these important developments in physics only gradually entered modernist consciousness. However, they were preceded by the development of new geometries whose implications were at least as radical as anything later developed in physics.[105]

 And of course not just by the development of new geometries, but all the above mentioned fields. We have to take into consideration that physicists at the same time were immersed on a process of adaptation to the new conceptualisations of causality, time and space. For example, only in 1927 was Werner Heisenberg proudly announcing the acausality of Quantum Mechanics, a mathematical interpretation contrary to the Newtonian tradition, which by then had a 200 year history in physics. However, the change from causality to acausality was developed from 1918 till 1928. The consequences of the indeterminacy conception given by physics in the 20's, and its acausality effect, run in parallel with the change in perception from the writers of the nineteenth century to the writers of the 20th century. Modernist writers had the chance to explore a world where events not necessarily had to happen due to a particular cause, antecedents and present were no longer connected.

There can be no comparison between physics and modernist literature however, what Einstein, Quantum Mechanics and their theoretical experiments caused was a revolutionary way to think of possibilities which were inconceivable before the 20th century. Musil and Mann used this change of perspective where time and space had become unified, they were no longer separate entities and in literature this phenomenon had to be adopted.

Heisenberg's ideas were followed by modernist's writers of the age.[106] According to him, mathematics could give an interpretation of the phenomena of particles' reality. Quantum Mechanics was no longer suited to human reality though; it opened a path for paradoxes and the annihilation of causality. This was a theme used in modern novels and short stories, either to support it or to entirely reject it.

In the period that goes from 1915 till 1925, a mixture of conceptualisation and redefinition of concepts was embracing the cultural environment of Germany. By the decade of the 20's, the three different ways physics could explain nature on a macroscopic level were Einstein's Relativity Theory, Maxwell's equations or Newtonian physics. On the other had, to explain microscopic phenomena Heisenberg's Matrix' mechanics, and Schrodinger's wave equation were the possible options.

For the development of their own narratives, the modernist writers Thomas Mann and Robert Musil used epistemological elements taken from these different theories such as the notions of a relative time and acausal events. Mann included a relativistic time in his novel *The Magic Mountain*

---

[105] Ibid. p. 40.
[106] Ibid. p. 53.

and for *The Man Without Qualities* Musil used the notion of acausality which agreed with a particular contemporary position of physics. To some extent both authors applied scientific conceptions to their novels, although one tended to possibilities of time and the other to events in space. But how were modernist writers able to grasp these concepts and introduce them into their novels? This will be addressed in chapters 3 and 4.

The role of the modernist writer was to some extent that of a social observer, who was able to abstract ideas and include them in their narratives, and they did this with ideas that were part of everyday life. The ideas were at the core of European cultural concerns and these authors used them to innovate and to narrate.

The concept of map will be decisive for the first two chapters. Commonly, a map has been considered a geographical device to represent spatial relationships between objects and territory. However, for the past 100 years, the notion of map as a visual representation of the relationship between ideas has been gradually emerging, and nowadays the concept is used to represent several notions such as the human genome or the scheme of a brain mapping.

Chapter one develops what I call the 'spatio-temporal map' of *Ulysses*. Reflecting on the notions of simultaneity and multiple points of view, Joyce conceived a new approach to representing an experience. He used those concepts to create a narrative map, whose main purpose was to give a more accurate, a more realistic representation of narrated events.

The strategy I use is as follow: first I describe the concept of simultaneity in *Ulysses*, then a specific structure Joyce developed in his narrative regarding this theme. Subsequently, I describe the concept of parallax, and after outlining how the two concepts were developed in Joyce's novel, I will stress his interest in the concept of mapping. Lastly, I outline how those concepts formed a unit; the spatio-temporal map of Joyce's narrative.

As will be seen, the acquisition of those concepts ran in parallel with a period in which Joyce's narrative began to change. It will be seen that exactly in this period, he was deeply concerned with scientific ideas such as those circulated by Henri Poincaré. By the end of the second decade of the 20th century, Joyce had developed a non-cursory approach to science and mathematics, and the concepts of simultaneity, parallax, and map were being addressed in *Ulysses*. I want to show how the chapters where these three topics were emphasised were written in the same period when Joyce was engaging in some important scientific and mathematical reading.

The second chapter will be dedicated to Woolf's narrative. To a certain extent, Woolf's case follows the same path as Joyce's. Woolf also reflected upon simultaneity and multiple points of view, and she was also deeply interested in the concept of a map. However, the ideas that Joyce abstracted in one single book, Woolf developed instead in several of her short stories as well as in

some of her novels, particularly in the period from 1917 until 1930. In a general sense, Woolf also established a robust dialogue with the scientific and technological ideas of her epoch.

Scholars such as Ann Banfield, Michael Whitworth, Gillian Beer and Holly Henry have already emphasized the ideas of multiple points of view, simultaneity and mapping within Woolf's literature. However, the idea of a 'spatio-temporal map' as the intersection of these three concepts has not been fully addressed, and this will be my contribution. For this purpose, I will focus on the relationship between Bertrand Russell and Virginia Woolf, the so-called age of mechanical reproduction, and Woolf's understanding of cartography.

The third chapter will be about Thomas Mann's interaction with the concept of relativity. What I want to address concerning Mann's *Der Zauberberg* (*The Magic Mountain*) is the constant awareness that the author shows of the importance of science in his time. Hans Castorp, his main character, is an engineer deeply concerned with scientific themes. What I want to stress in this chapter is how science was undergoing a redefinition of its scopes, and how Thomas Mann managed to capture this in his narrative, especially when addressing the time-space continuum.

This chapter will show how Thomas Mann acquired the idea of the relativity of time. I will relate this acquisition to the ideas of three different thinkers, Ostwald Spengler, Henri Bergson and Albert Einstein. First I will define the period of time when, while writing *The Magic Mountain*, Mann got in touch with relativity, and how that notion gave a new direction to one of the principal themes of his novel: time and its flux.

Chapter number four will be focused on Musil's affinity to the concept of acausality. It took twenty years for Musil to write *Der Mann ohne Eigenschaften* (*The Man Without Qualities*). In that time the principle of causality underwent a radical change. I want to show how Musil, who at the beginning of his book seemed to be profoundly convinced of that principle, by the end had developed a notion which agreed much more with the notion of the concept within the theory of Quantum Mechanics, being developed at the same time.

Musil was extremely close to science by training: he had studied engineering and had dedicated his thesis to Ernst Mach. What I would like to show in this chapter is that there is a direct connection between the abandonment of the principle of causality by the physicists of the early 20th century and Musil's idea of acausal events in *The Man Without Qualities*. In this chapter I will pay special attention to the ideas Musil borrowed from Mach, and those he developed reflecting on Spengler.

The common denominator of the next four chapters has to do with the perception of the four writers about the ideas of simultaneity, multiple points of view, relativity and acausality, and how they include them in their narrative. These ideas nowadays are part of our time and space

perception. As has been seen in this introduction, the beginning of the 20th century saw an inclusion of these ideas in the common understanding of the world.

For the acquisition of these ideas in the human perception of the world the contribution of scientists and mathematicians, modern technologies and philosophers was necessary. The following four chapters will show how the artists of the period were capable of understanding the importance of these new ideas. If they changed human perception of the world, then the narrative had to undergo this transformation, and the characters taking part in the narrated events also had to acquire a new perception of the world.

Chapter 1.

JOYCE AND THE SPATIO-TEMPORAL MAP OF *ULYSSES*[107]

This chapter is about James Joyce and his interest in cartography as a scientific tool for the development of his narrative. In *Ulysses* Joyce developed a narrative, deeply concerned with geography, which is able to provide a new way of understanding the context where the characters are localized in space but also in time. Joyce not only focused his attention on a spatial description of events, but by adding time as another dimension, the spatial descriptions of his narrative became much more accurate. In *Ulysses* the events that happen in each chapter are related to a specific hour of the day. By organizing the chapters of his novel according to the different hours of a day, the reader becomes aware of the different actions that the characters are realizing in a precise moment and in a particular part of the city of Dublin.

In the first part of the chapter, it will be seen how James Joyce achieved a more precise spatio-temporal description of the events by including the concepts of simultaneity and multiple points of view within his scientific cartography discourse. The second part of the chapter will show how the spatio-temporal description achieved by Joyce in his narrative is close to the spatio-temporal description proposed by Henri Poincaré in his book *Science and Hypothesis*[108] (1902).

In this chapter, there are two different themes I would like to address. The first concerns how by focusing on the concepts of simultaneity and multiple points of view, which were born at the end of the nineteenth century, Joyce created a spatio-temporal map within *Ulysses*. It will also be seen that this map was fully conceived of by the last years of the 1910s. The second is to show the proximity the spatio-temporal map shares with the scientific ideas of his times. In a sense these scientific ideas can be found within the main structure of *Ulysses*.

After developing each subject, it will be seen that the two themes are interconnected, that the structure I am calling the spatio-temporal map of *Ulysses* came to be entirely configured more or less at the same time as when Joyce was getting in touch with the scientific ideas of the mathematician Henri Poincaré (1854-1912).

Moving from the two mentioned concepts, which in the first decade of the 20th century came to be at the core of the scientific and technological developments of western culture, Joyce conceived a new approach to represent experience. This new approach allowed him to shape a new narrative style.

In the next pages I will sketch the concept of simultaneity as developed in *Ulysses*. Joyce used

---

[107] J. Joyce, *Ulysses*, Gabler Ed. Garland Publishing, Inc. New York & London, 1985.
[108] Poincaré Henri. *Science and Hypothesis*. New York. Dover Publications, Inc, 1952.

this concept in two different ways: the narration of thoughts and actions of a character at the same time, and the different actions taking place at the same time at a distance. I will discuss a specific structure that Joyce developed within his narrative regarding this theme. I will then follow the same path with the concept of parallax. The interpretation Joyce gave of this concept had to do with the different perspectives an object can be seen from. By the time he was writing the last chapters of his novel, he was fully aware of the curious implications of the geometrical and astronomical concept of parallax for his narrative. In *Ulysses* this word appears seven times[109]. His aim in using it was to emphasise notions associated with it, which will be explained below. After outlining how the two concepts were developed in Joyce's novel, I will stress the interest Joyce had for the concept of map, and his desire to include this notion within *Ulysses*. Finally, I will outline how the three ideas form a unity that I will call the spatio-temporal map of Joyce's narrative.

By the end of the second decade of the twentieth century, Joyce had developed a non-cursory interest in science and mathematics, and the three concepts to be discussed were confronted with this interest. In the last part of the making of *Ulysses*, Joyce was very interested in the different scientific notions that were circulating in his epoch. As it will be seen, the ideas exposed by Henri Poincaré in his book *Science and Hypothesis* and the structure of the spatio-temporal map, are closely related to each other.

1.1. *Organising simultaneity*

The idea of simultaneity is directly linked to the idea of time and its flux. For a better understanding of how the idea of simultaneity is a crucial aspect in Joyce's narrative, I will dedicate a couple of paragraphs to the subject of time and its importance within *Ulysses*.

Ulysses is a novel about time; time is one of the motifs, one of the most important aspects of the book. The book pursues an answer to the question: how is it possible to narrate time? This is a question several authors were tackling in the same epoch. For example, in the *The Magic Mountain*[110] the narrator is concerned with this question. However *Ulysses* is not only about time, it is also about space, and both themes will be considered later on.

If we look at the structure of *Ulysses* we see that it is divided into eighteen chapters, and in each chapter a precise period of time can be measured, except for the last one, the monologue from Molly, and the exact time cannot be told or measured. According to the schemes given by Joyce in 1920 and 1921 to his friends Carlo Linati and Stuart Gilbert, respectively, this last chapter remains

---

[109] Joyce used the word in Chapter 8 three times, in Chapter 14 once, in Chapter 15 twice, and in chapter 17 once.
[110] Mann, Thomas. *The Magic Mountain*, Vintage. 1996.

in infinite time.[111]

The entire day of Leopold Bloom is narrated with extreme detail, almost with scientific precision. In *Ulysses*, each episode is constrained by the hours when the actions take place. However, the thoughts of the characters maintain a constant, internal dialogue, which is independent of time, and of the succession of events.

In parts of Joyce's narrative the thoughts of the characters are mixed with the actions of the characters; there is no distinction whatsoever leading the reader to understand which are the actions and which are the thoughts of the characters. This narrative technique was recognized as the "interior monologue" (*monologue intérieur)*, an expression which was first coined by the French author Paul Bourget (1852-1935) in his book *Cosmopolis*.[112] James Joyce recognised that he had borrowed this technique from his reading of Edouard Dujardin, and specifically from the book *Les Lauriers sont coupés,* which he read during his first visit to Paris in 1902.

> On the way he picked up at a railway kiosk a book by Edouard Dujardin, whom he knew to be a friend of George Moore. It was *Les Lauriers sont coupés*, and in later life, no matter how diligently the critics worked to demonstrate that he had borrowed the interior monologue from Freud, Joyce always made it a point of honor that he had it from Dujardain.[113]

Joyce was impressed by this technique because it provided a narrative that allowed the reader to know exactly what the different characters were not only doing but also thinking when an action is taking place. "…'in that book,' he said, 'the reader finds himself established, from the first lines, in the thought of the principal personage, and the uninterrupted unrolling ('déroulement ininterrompu') of that thought, replacing the usual role of narrative, conveys to us what this character is doing or what is happening to him."*[114]* Thus the technique adopted by Joyce bifurcates the linearity of the written text. With the interior monologue technique Joyce achieved the description of actions and thoughts of the characters.

Due to this technique, from the beginning of the book the reader has to deal with a lack of clarity in the events that are taking place in *Ulysses*. The reader must wait to understand the plot, and in the meantime, he/she is confronted with sentences that may make no sense. This happens because words within the scheme of a book—as material objects—do not allow for more than one direction or dimension, enabling the reader to tell what a character might be thinking while acting. When the thoughts and the actions of a character are narrated at the same time, the words of the narrator cannot clearly be distinguished from the words employed by the character.

At the same time, we do live among our thoughts or memories, and what our senses feel. If I am

---

[111] R. Ellman. *Ulysses on the Liffey*. Oxford University Press, New York. 1972. Appendix: *The Linati and Gorman – Gilbert Schemas Compared*. pp 186-189.

[112] P. Bourget, C*osmopolis*, Alphonse Lemerre, Paris, 1893.

[113] Ellman, Richard. *James Joyce*. New York: Oxford University Press, 1959. p. 131.

[114] Ellman, Richard. *op. cit.* p. 534, note 113.

walking in the street alone I might be thinking about what I see, but in my mind there may also be other ideas, which might absorb me more than what I am seeing. Our perception is a constant interaction between several dimensions, and in our daily life they dictate what we are capable of understanding concerning our surroundings. Joyce wanted to capture this aspect of human perception.

What he achieved was to frame two different realities, the inner and the outer, our thoughts and our actions, which are somehow united in a simultaneous act through the flux of time. He was able to capture the simultaneity of thought and action, one of his main aims: "In *Ulysses* I have recorded, simultaneously, what a man says, sees, thinks, and what such seeing, thinking, saying does, to what you Freudians call the subconscious…"[115]

Joyce was not the first to try simultaneity in a novel. We find examples of the simultaneity of events, for example in chapter eight of the second part of Gustave Flaubert's[116] *Madame Bovary*[117] (1857). The narrative is situated in the Agriculture Fair and when the councillor is going to start his speech Rodolphe and Emma, who are on the first floor of the "council room" inside the tower hall, observe the actions happening below from a window:

> Rodolphe, meanwhile, with Madame Bovary, had gone up to the first floor of the town hall, to the 'council-room,' and, as it was empty, he declared that they could enjoy the sight there more comfortably. He fetched three stools from the round table under the bust of the monarch, and having carried them to one of the windows, they sat down by each other.

> There was commotion on the platform, long whisperings, much parleying. At last the councillor got up. They knew now that his name was Lieuvain, and in the crowd the name was passed from one to the other. After he had collated a few pages, and bent over them to see better, he began:

> 'Gentlemen! May I be permitted first of all (before addressing you on the object of our meeting today, and this sentiment will, I am sure, be shared by you all), may I be permitted, I say, to pay a tribute to the higher administration, to the government, to the monarch, gentlemen, our sovereign, to that beloved king, to whom no branch of public or private prosperity is a matter of indifference, and who directs with a hand at once so firm and wise the chariot of the State amid the incessant perils of a stormy sea, knowing, moreover, how to make peace respected as well as war, industry, commerce, agriculture, and the fine arts.'

> 'I ought,' said Rodolphe, 'to get back a little farther.'

> 'Why?' said Emma.

> But at this moment the voice of the councillor rose to an extraordinary pitch. He declaimed:

> 'This is no longer the time, gentlemen, when civil discord ensanguined our public places, when the landlord, the business-man, the working-man himself, falling asleep at night, lying down to peaceful sleep, trembled lest he should be awakened suddenly by the noise of incendiary tocsins, when the most subversive doctrines audaciously sapped foundations—'

> 'Well, someone down there might see me,' Rodolphe resumed, 'then I should have to invent excuses for a fortnight; and with my bad reputation—'

---

[115] Ibid. p. 538. Ellman took this citation from Djuna Barnes, "James Joyce", *Vanity Fair*, XVIII, April 1922, p. 65.
[116] Joyce was a great admirer of Flaubert since his youth.
[117] Flaubert Gustave, *Madame Bovary*. Arcturus Publishing Limited, London. 2009.

'Oh, you are slandering yourself,' said Emma.

'No! It is dreadful, I assure you.'

'But, gentlemen,' continued the councillor, 'if, banishing from my memory the remembrance of these sad pictures, I carry my eyes back to the actual situation of our dear country, what do I see there? Everywhere commerce and the arts are flourishing; everywhere, new means of communication, like so many new arteries in the body of the State, establish within it new relations. Our great industrial centres have recovered their activity; religion, more consolidated, smiles in all hearts; our ports are full, confidence is born again, and France breathes once more!'[118]

The narrator is simultaneously narrating the conversation between Rodolphe and Emma and the speech given by the councillor, continuing until the councillor's speech and the meeting are over and Rodolphe and Emma split. The narration describes both the conversations and the speech of the councillor in the third person. However, some of the implications deriving from the use of simultaneity events, like the ones mentioned before by Joyce such as the simultaneity in action, thought and speech of the characters, were never fully developed before *Ulysses*.

Apart from the interior monologue technique, Joyce uses another technique in his narrative, that of free indirect speech. It is important to mention this technique because it is also fundamental for the understanding of simultaneity.

---

[118] Flaubert Gustave, *op cit*. pp. 124-125, note 117. The original text:

   Cependant Rodolphe, avec Mme Bovary, était monté au premier étage de la mairie, dans la *salle des délibérations*, et, comme elle était vide, il avait déclaré que l'on y serait bien pour jouir du spectacle plus à son aise. Il prit trois tabourets autour de la table ovale, sous le buste du monarque, et, les ayant approchés de l'une des fenêtres, ils s'assirent l'un près de l'autre.
   Il y eut une agitation sur l'estrade, de longs chuchotements, des pourparlers. Enfin, M. le Conseiller se leva. On savait maintenant qu'il s'appelait Lieuvain, et l'on se répétait son nom l'un à l'autre, dans la foule. Quand il eut donc collationné quelques feuilles et appliqué dessus son oeil pour y mieux voir, il commença :
   «Messieurs,
   « Qu'il me soit permis d'abord (avant de vous entretenir de l'objet de cette réunion d'aujourd'hui, et ce sentiment, j'en suis sûr, sera partagé par vous tous), qu'il me soit permis, dis-je, de rendre justice à l'administration supérieure, au gouvernement, au monarque, messieurs, à notre souverain, à ce roi bien-aimé à qui aucune branche de la prospérité publique ou particulière n'est indifférente, et qui dirige à la fois d'une main si ferme et si sage le char de l'État parmi les périls incessants d'une mer orageuse, sachant d'ailleurs faire respecter la paix comme la guerre, l'industrie, le commerce, l'agriculture et les beaux-arts.»
   – Je devrais, dit Rodolphe, me reculer un peu.
   – Pourquoi ? dit Emma.
   Mais, à ce moment, la voix du Conseiller s'éleva d'un ton extraordinaire. Il déclamait :
   «Le temps n'est plus, messieurs, où la discorde civile ensanglantait nos places publiques, où le propriétaire, le négociant, l'ouvrier lui-même, en s'endormant le soir d'un sommeil paisible, tremblaient de se voir réveillés tout à coup au bruit des tocsins incendiaires, où les maximes les plus subversives sapaient audacieusement les bases...»
   – C'est qu'on pourrait, reprit Rodolphe, m'apercevoir d'en bas ; puis j'en aurais pour quinze jours à donner des excuses, et, avec ma mauvaise réputation...
   – Oh ! vous vous calomniez, dit Emma.
   – Non, non, elle est exécrable, je vous jure.
   « Mais messieurs, poursuivit le Conseiller, que si, écartant de mon souvenir ces sombres tableaux, je reporte mes yeux sur la situation actuelle de notre belle patrie: qu'y vois-je ? Partout fleurissent le commerce et les arts; partout des voies nouvelles de communication, comme autant d'artères nouvelles dans le corps de l'Etat, y établissent des rapports nouveaux; nos grands centres manufacturiers ont repris leur activité; la religion, plus affermie, sourit à tous les coeurs ; nos ports sont pleins, la confiance renaît, et enfin la France respire !...»
   Flaubert Gustave, *Madame Bovary*. Garnier-Flammarion. Paris. 1966. pp. 172-173.

Free indirect speech is a narrative technique where the narrator narrates the story as if he/she for a moment could become one of the characters and feel, sense or perceive what the character is feeling, sensing or perceiving. This technique has been recognised because the narrator uses the words that the characters would use to describe their own experiences.

In the book *Joyce's Voices*[119], Hugh Kenner defines the free indirect discourse as 'The Uncle Charles Principle'. He defines this principle as 'the narrative idiom need not be the narrator's'. According to Kenner, the narrator speaks in the name of the character, he/she is not describing the action, as he/she normally would do. Instead the he/she is describing the actions as the characters would describe them from their own position. In a sense, the narrator becomes the voice of what the characters want to say. Using this technique the narrator describes the actions just as the characters would.

In this way, the description of the events occurring in *Ulysses* are simultaneous descriptions by the character (interior monologue), by the omnipresent narrator, and from the point of view of the characters in the voice of the narrator.

Joyce used the concept of simultaneity at several different levels. To approach the notion, what we have to do first is to clarify the different levels at which the phenomenon may occur. In *Ulysses* we may distinguish three different layers in the conception of simultaneity.

The first can be recognized when the narrative shows what the characters, such as Leopold Bloom or Molly, think and do at the same time. This technique is constantly recurring in *Ulysses,* and allows the reader to know what the character is thinking, as well as what he or she is doing. Joyce emphasised how the perception of a human being is a conjunction of two different elements: 1) his or her senses, the relationship with other humans and the exterior world (an outer perception), and, 2), his or her own thoughts (an inner perception). When a certain situation is taking place, we experience both perceptions, and Joyce narrated them accordingly. For example, in the chapter "Calypso" we can find the following words representing the thoughts of Bloom, although in the last line it is the narrator who is speaking: "Timing her. 9.15. Did Roberts pay you yet? 9.20. What had Gretta Conroy on? 9.23. What possessed me to buy this comb? 9.24. I am swelled after that cabbage. A speck of dust on the patent leather of her boot".[120]

Furthermore, we can find the case when actions and thoughts are taking place at the same time. In the chapter "Lestrygonians", Bloom is in a bar ordering some food, when the words spoken by Nosey Flynn made him turn to the clock and start thinking: "A warm shock of air heat of mustard haunched on Mr Bloom's heart. He raised his eyes and met the stare of a bilious clock. Two. Pub

---

[119] Kenner Hugh. *Joyce's Voices.* Faber and Faber. London, 1978.
[120] Joyce, *op cit.* p. 137.521, note 107.

clock five minutes fast. Time going on. Hands moving. Two. Not yet".[121]

This is a precise situation where the mixing of the narrator's narrative with Bloom's thoughts can be appreciated, because in the first two sentences the narrator is the one who is telling the story whereas in the last six—including the two times the word two is mentioned—Bloom is the one who is narrating. This duality is intrinsically related to the flux of time: here Joyce is emphasizing this duality and its relationship with time.

The second layer of simultaneity can be seen when different characters interact among each other, in the same scenario, with their own thoughts and actions. "Nausicaa" is the chapter that will be helpful for the understanding of this phenomenon.

The scene takes place on the beach, Sandymount Strand, where some fireworks are going to be displayed. Gerty MacDowell is there with a couple of friends to see the spectacle. Leopold Bloom also arrives and, at some distance, they both start thinking about each other, and start flirting with each other. Joyce shows a situation where not only the characters think and act at the same time, but they also interact with others. The narrative becomes a sort of dialogue of thoughts, where a certain action is also taking place.

The episode in 'Nausicaa' is in two parts. In the first part the reader can learn about the thoughts and actions of Gerty MacDowell, whereas in the second, the reader becomes familiar with the thoughts and actions of Leopold Bloom. According to John Bishop, both parts of the chapter need to be read to gain a complete understanding of the events. The two parts are "coupled" and are '…related more as sequential complements than as contrastive opposites…'[122]. Bishop outlines a characteristic of the chapter that is significant for the idea of simultaneity, which here refers to the actions and thoughts of a character who is watching the actions of another, who is located in the same scene although considerably far away. This means that while Gerty MacDowell in the first part of the episode is acting and thinking, she is watching how Bloom is giving pleasure to himself. And then, in the second part of the episode it is Bloom the one who starts thinking and acting while Gerty is slowly disappearing from the scene. 'Two no less critical, yet unexamined gaps of unrepresented time transpire within "Nausicaa" itself, since we never learn exactly what moves through Bloom's mind during the first part of the episode, while he is undergoing tumescence and masturbating, or what occurs to Gerty during the second part of the episode, while she travels home and Bloom desultorily fights off his deflated thoughts of agedness, fatigue, and the manifold miseries of domestic life.'[123] It is true that there is a lack of information and that Joyce did not

---

[121] Ibid. p. 365.789.
[122] John Bishop. 'A Metaphysics of coitus in 'Nausicaa''. In *Ulysses En-gendered Perspectives* Edited by Kimberly J. Devlin and Marilyn Reizbaum. University of South Carolina, 1999. p. 189.
[123] J. Bishop. *op cit.* p. 189, note 122.

simultaneously narrate the thoughts and actions of Gerty and Bloom. Still, he used the concept of simultaneity for the description of Gerty's actions and thoughts while watching the actions of Bloom and later on in the episode the actions and thoughts of Bloom will come to be known while Gerty is going away.

At a certain point of the chapter, Leopold Bloom notices that his watch has stopped at half past four. Later on the reader will discover that this is the precise time when his wife, Molly, was committing adultery. This event reflects Joyce's interest not only in the simultaneity of thoughts and actions among people in the same space. In *Ulysses* the reader can tell when different spatial events, taking place in different parts of Dublin, happen simultaneously. Joyce narrated different actions that occurred to different characters at the same time but in different places, and connected them using certain elements. One of the most representative examples to be found in *Ulysses* is the cloud that Stephen and Bloom see respectively in the chapters "Telemachus" and "Calypso". And in the chapter "Wandering Rocks", where (without counting Father Conmee's journey and the trip to Sandymount) eighteen different moments are narrated: from some hints dropped by the narrator, it can be inferred that all of them happened simultaneously. These ideas are part of the next layer of simultaneity.

The third layer unfolds when Joyce narrates the actions of different characters in different scenarios at exactly the same time: the simultaneity of actions spatially apart from each other. For example, the first three episodes happened simultaneously with the next three episodes. In the first three, Stephen Dedalus is the main character, whereas in the next three the story focuses on Leopold Bloom's actions. There are several clues that allow us to understand that the actions of both characters are happening at exactly the same time. For example, the cloud in the sky – already mentioned – observed by both characters. Stephen watches it: 'A cloud began to cover the sun slowly, shadowing the bay in deeper green.'[124]. And in episode four, the same cloud is being watched by Bloom: 'A cloud began to cover the sun slowly, wholly. Grey. Far.'[125] This is the same cloud, because its description by the narrator in both chapters is the same. It can also be seen that the characters are distant from each other because in the case of Stephen, the cloud is situated above him, whereas the cloud seen by Bloom is described as being far away.

Furthermore, in the schema provided to Stuart Gilbert in 1921, Joyce highlighted the time schedule of the chapters, with the hours in which the actions take place. Although from the beginning Joyce was thinking in terms of the unity of the first six episodes, he only thought about the simultaneity of the actions after 1920: the schemas given to his friends are different. More

---

[124] J. Joyce. *op cit*. p. 17.248, note 107.
[125] Ibid. p. 119.218.

exactly, the schema given to Carlo Linati has different time schedules in the chapters of "Proteus" and "Hades", whereas in the one given to Gilbert, the hour in which both chapters occur is the same.

In the chapter "Wandering Rocks", eighteen different movements of the characters through the city are described. Each of these wanderings through Dublin takes place between 2.55 p.m. and 4 p.m. We can deduce that all of them are taking place simultaneously because within the narrative there are passages that join the actions in a temporal sense: "Joyce's orchestration of Dublin locations and movements in Wandering Rocks contains some generally realized patterns, some framing and orienting schemes, and some sure-fire traps".[126] As Seidel says, it seems Joyce is 'orchestrating', arranging the movements, giving them clear patterns to provide his portrayal of the city. Throughout this chapter the concept of simultaneity becomes necessary for the 'orchestration' of the movements, because without the actions taking place exactly at the same time, the reader would be unable to gain such clearly defined vision of the city.

In this chapter, each of the characters moves through the city apparently aimlessly, there is movement of the characters and their actions but its direction is undefined. From Artifoni to Gerty MacDowell, what Joyce is offering are images of the actions that each character, in its particular spatial location, is pursuing. So the reader gains a complete image of what is happening in the city of simultaneously at any particular moment. In Clive Hart and David Hayman's *James Joyce's Ulysses: Critical Essays*[127] the chapter dedicated to "Wandering Rocks" addresses this idea. In Hart's essay there is a scheme marking the time and place where the characters appearing in this chapter are located.

By the end of the chapter, readers have the impression they know Dublin through the eyes of the characters. It is like picking a particular moment and being able to see what is happening in the entire city, which cannot happen only with one sight – unless you are situated above the city – but with eighteen different sights, all of them moving through the streets of Dublin.

What we can say about the three layers Joyce used to frame simultaneity in his narrative, is that he went from the most "simple" (the actions and thoughts of a single character), to the most elaborate (the actions and thoughts of several characters at a distance from each other): "The structure of *Ulysses* (though to a lesser extent than that of the *Wake*) indicates that Joyce aspired to outsoar the category of time and see a simultaneous universe – to take, so to speak, a God's-eye view of the cosmos".[128]

---

[126] M. Seidel, *Epic Geography: James Joyce's Ulysses*, Princeton University Press, Princeton NJ, 1976, p. 185.

[127] Hart Clive. 'Wandering Rocks'. In *James Joyce's Ulysses: Critical Essays*. Edited by Clive Hart and David Hayman. University of California Press Ltd. London, 1974.

[128] S. Gilbert, *James Joyce's Ulysses*, London: Faber and Faber, 1960, p. 353.

However, Joyce also used the ideas of parallax and mapping in order to achieve a representational system that turned out to be much more complex than whatever had been tried before.

1.2. *Parallax*

In *The Oxford English Dictionary* the concept of parallax is defined as follows: 'ad. Gr παράλλαξις, change, alteration, alternation, mutual inclination of two lines meeting in an angle, f. παράλλάσσειυ to alter, alternate, in mod. L. *parallaxis*.'[129] In physics, particularly in astronomy, the word denotes an apparent change in the observational position of an object due to a change in the position of the observer: '1. A. (Astron.) Apparent displacement, or difference in the apparent position, of an object, caused by actual change (or difference) of position of the point of observation; *spec*. the angular amount of such displacement or difference of position, being the angle contained between the two straight lines drawn to the object from the two different points of view, and constituting a measure of the distance of the object.'[130]

One of the pioneers in the use of a multiple point of view technique had been the American-English writer Henry James.[131] Joyce used the notion of parallax to convey the different possible interpretations of the same event. Declan Kiberd, for example, commenting on *Ulysses,* noted the different explanations given by Bloom or Molly concerning the other. And Budgen said of Leopold Bloom: "Leopold Bloom is sculpture in the Rodin sense. He is made of an infinite number of contours drawn from every conceivable angle".[132]

As mentioned above, in *Ulysses* James Joyce used the word parallax seven times. The first time is in episode 8, 'Lestrygonians', where it appears three times. Then he uses the word only in the last chapters, in chapter 14 once, in chapter 15 twice and finally in chapter 17 again once. Every time, the meaning of the word alludes to the concept of perspective or points of view. Below are three examples of where Joyce employed the word. In 'Lestrygonians':

> Now that I come to think of it, that ball falls at Greenwich time. It's the clock is worked by an electric wire from Dunsink. Must go out there some first Saturday of the month. If I could get an introduction to professor Joly or learn up something about his family. That would do to: man always feel complimented. Flattery where least expected. Nobleman proud to be descended from some king's mistress. His foremother. Lay it on with a trowel. Cap in hand goes through the land. Not go in and blurt out what you know you're not to: what's parallax? Show this gentleman the door.[133]

---

[129] J.A. Simpson and E.S.C. Weiner. *The Oxford English Dictionary*. Second Edition. XI. Clarendon Press Oxford, 1989. p.192.

[130] J.A. Simpson and E.S.C. Weiner. *op. cit.* p.192, note 129.

[131] D. Lodge, *The Art of Fiction,* Secker & Warburg, London, 1992. Chapter 6 of this book is dedicated to the relationship between Henry James and the multiple points of view concept.

[132] F. Budgen, *James Joyce and the Making of the Ulysses*, Indiana University Press, Bloomington, 1960, p. 64.

[133] Joyce J. *op. cit*. p. 351.571., note 107.

In the chapter 'Oxen of the Sun':

They fade, sad phantoms: all is gone. Agendath is a waste land, a home of screechowls and the sandblind upupa. Netaim, the golden, is no more. And on the highway of the clouds they come, muttering thunder of rebellion, the ghosts of beasts. Huuh! Hark! Huuh! Parallax stalks behind and goads them, the lancinating lightning's of whose brow are scorpions.[134]

In the chapter 'Circe', when Virag and Bloom are speaking and Virag says:

(*not unpleasantly*) Absolutely! Well observed and those pannier pockets of the skirt and slightly pegtop effect are devised to suggest bunchiness of hip. A new purchase at some monster sale for which a gull has been mulcted. Meretricious finery to deceive the eye. Observe the attention to details of dustpecks. Never put on you tomorrow what you can wear today. Parallax! (With a nervous twitch of his head) Did you hear my brain go snap? Pollysyllabax![135]

In the course of the novel, the meaning of the word changes. The first times Joyce used the word he is focusing on its sound, or alluding to a psychological interpretation of multiple points of view, rather than conveying any scientific meaning. However, in his last chapters it is clear that he was aware of its astronomical meaning: "CHRIS CALLINAN: What is the parallax of the subsolar ecliptic of Aldebaran?"[136] Therefore it can be inferred that in the eight years that Joyce was writing *Ulysses* his conception of what the word parallax meant, developed from one definition to a definition including a scientific connotation. In the chapter "Ithaca", a chapter before the last one, it is clear that Joyce was acquainted with the astronomical definition of the word:

With what mediations did Bloom accompany his demonstration to his companion of various constellations?

Mediations of evolution increasingly vaster: of the moon invisible in incipient lunation, approaching perigee: of the infinite lattiginous scintillating uncondensed milky way, discernible by daylight by an observer placed at the lower end of a cylindrical vertical shaft 5000 ft deep sunk from the surface towards the centre of the earth: of Sirius (alpha in Canis Maior) 10 lightyears (57,000,000,000,000 miles) distant and in volume 900 times the dimension of our planet: of Arcturus: of the precession of equinoxes: of Orion with belt and sextuple sun theta and nebula in which 100 of our solar systems could be contained: of moribund and of nascent new stars such as Nova in 1901: of our system plunging towards the constellation of Hercules: of the parallax or the parallactic drift of socalled fixed stars, in reality evermoving wanderers from immeasurably remote eons to infinitely remote futures in companion with which the years, threescore and ten, of allotted human life formed a parenthesis of infinitesimal brevity.[137]

So by the last episodes of the book Joyce knew the scientific definition. Nevertheless, in some cases he still uses it to convey the different perspectives, the different points of view an observer could employ to delimit an object, or a particular situation. This double definition is clearly exemplified in "Circe", where the first time he mentions it, it is associated with an astronomical definition, whereas the second time the character Virag uses it, alluding to a multiple point of view phenomenon.

---

[134] Ibid. p.893.1085.
[135] Ibid. p.1111.2329.
[136] Ibid. p.1057.1655.
[137] Ibid, p.1539.1040.

Kiberd has noticed another aspect of the word and its use. In *Ulysses* Joyce associates a psychological dimension to the notion of parallax: "Decent quiet man he is: a psychological version of parallax, the apparent displacement of an object by the various viewpoints adopted by its beholder. Which Bloom is real? The one we know? Or the various ones here?"[138]

Thus the concept of parallax is used by Joyce in two different ways: 1) parallax has to do with a physical perception of a certain situation as seen from different points of view, and 2), as referred to a psychological aspect, parallax has to do with how others see us, and how we see others.

The chapter "Nausicaa" is an example of both. In this chapter, Gerty MacDowell, as well as Leopold Bloom, are immersed in a situation where each has a perception of the other, and of the situation. The scene is presented from two different points of view, first Gerty's, and then Bloom's, and both the psychological and the physical points of view are in play. As Bishop writes at the beginning of his article: "Nausicaa" develops the "parallactic" technique put lengthily in to play in "Cyclops" by presenting its reader with alternate perspectives on the same scene though here only two of them rather than many…'[139]Apart from the thoughts of each, we also have the description of the place where the action takes place and is narrated by both characters. Each of them has a particular way of interpreting the same scene. In the case of Gerty, her perception is more artistic '…so takes on the representational status of a painting'[140], whereas Bloom narrates the scene in more scientific terms. In a sense, this is still part of the complementarity that Bishop outlines in his article and that has been mentioned before.

The chapter of "Wandering Rocks" is also an important example: here the parallax notion is fully employed, as viewpoints. Different perspectives of Dublin are presented through the vision of several characters, providing their own particular point of view of the city. Budgen remarks that in this chapter:

> The viewpoint changes from one sentence to another so that the reader must be continually on the alert to follow the variations of scale and angle. The view constantly changes from a close-up to a bird's-eye view. A character is introduced to us at close-up range, and suddenly, without warning, the movement of another character a mile distant is described. The scale suddenly changes. Bodies become small in relation to the vast space around them. The persons look like moving specks. It is a town seen from the top of a tower.[141]

Thus far, we have the role of the notions of simultaneity and parallax within *Ulysses*. In the next sections, I will show first how Joyce was deeply concerned with what a map can provide for the narrative, and second, how he combined the concepts of simultaneity, parallax, and mapping for the

---

[138] J. Joyce, *Ulysses*, Penguin Books, London, 2000. p.1010. Comment by Declan Kiberd (ed. of *Ulysses*), referring to page 226 of this edition.
[139] J. Bishop. *op cit.* p. 185, note 122.
[140] Ibid. p. 188.
[141] Budgen, *James Joyce and the Making of the Ulysses. op. cit*, p.124, note 132.

creation of the spatio-temporal map.

1.3. *Joyce and Cartography*

> Father Conmee used to say that James's letters home, which invariably began by announcing he was well and proceeded by listening the current needs, sounded like grocer's lists. To John Joyce they indicate something else; he was to comment on his son, 'If that fellow was dropped in the middle of the Sahara, he'd sit, be God, and make a map of it.'
> Interview with Mrs. Eileen Schaurek, 1953.[142]

A map is an abstract representation of the world which, by its diagrammatic description, helps to frame a certain area of space - it can be for the land as well as the sea, even for the universe, although it is not restricted to space only - where physical features such as a cities, roads, etc. can be represented. The concept of space is represented within a map by four features: shape (maybe the shape of a continent or of the earth), area (maybe the area of a country), direction (maybe the orientation of the map regarding compass directions), and the distances between the objects represented in the map. The process of mapping involves a function combining reality and abstraction. Following recent developments, biological, neurological and astronomical to mention just three, a map can even be built from elements having no connection with the natural world, as can be seen in the so-called map of the brain, the DNA map and the map of the universe.

Cartography has a long tradition, and through it one can abstract the cultural features of the time when it was conceived. A map can convey how past cultures perceived the world. In a sense, a map offers a synthesis of the culture and civilization that produced it.

> ...early preliterate peoples—as well as those of our own time, or close to our time—have used widely different means to express themselves cartographically and that their maps are marked by variety in objective, symbolism, scale, and materials. Similarly, the cartography of literate peoples in antiquity shows remarkable variety in form and function.[143]

Cartography, of course, has changed because of technological innovation. In the second half of the nineteenth century, photography was responsible for altering in depth the ways in which maps were made. Aerial photography came to provide the modern perspective on the ways in which maps were designed, first from balloons, and after 1910 from airplanes. The airplane revolutionized map making so greatly that its impact may be compared with how printing revolutionized the Renaissance period. The modern period of cartography started in 1891, when the International Map

---

[142] Ellman, *James Joyce, op. cit*, p. 28, note 113.
[143] N. J.W. Thrower, *Maps and Civilization: Cartography in Culture and Society*, The University of Chicago Press, Chicago, 1996, p. 13.

of the World (IMW) was proposed. With a scale of 1:1,000,000, by 1913 a complete map of the world was generated, where railways, roads and towns are represented.

Joyce was deeply concerned with the concept of map. Its introduction in *Ulysses* as a narrative technique was a tool for developing new representations of space and time. His interest in maps can be documented from 1906, when he needed to have an accurate vision of Dublin: 'He wished he had a map of Dublin and Gilbert's history and some photographs of the country'.[144] As happened with so many modernists, Joyce was interested in maps, cities, and their relationship to the novel: "Modernist writing has a strong tendency to encapsulate experience within the city, and to make the city-novel or the city-poem one of its main forms".[145]

The idea of map was so present in the thoughts of Joyce that once, while speaking with Frank Budgen, he stated his intention to abstract the city of Dublin and completely re-present it in his narrative:

> One important personality that emerges out of the contacts of many people is that of the city of Dublin.
>
> 'I want,' said Joyce, as we were walking down the Universitätstrasse, 'to give a picture of Dublin so complete that if the city one day suddenly disappeared from the earth it could be reconstructed out of my book'.
>
> We had come to the university terrace where we could look down on the town.[146]

In *Ulysses* one remarkable feature is the accurate presentation of the characters' movements within a precise spatial dimension. Geography is not a tool for narrating the story; what Joyce is doing is to generate the geography of Dublin by mapping the different trajectories followed by his characters. At each step, another image of what Dublin looks like is revealed, so geography is inherent in the development of the story. For Joyce, the places and paths followed by his characters play a central role in the account of the events.

Ulysses' geography is based on two geographic spaces: physical and imaginary, Dublin and the Mediterranean respectively. Joyce adopted the *Odyssey* as a structural map for *Ulysses*, not only for the situations and the characters, but also in a geographic sense. As is well known, each of the places in *Ulysses* where its actions occur are linked to places mentioned in the *Odyssey*. According to Michael Seidel's study,[147] where he compares the two geographie*s*, Joyce superimposed the map of Dublin on that of the Mediterranean. Joyce established a function (in a mathematical sense where an element of one set is related to an element of another set) between the two works while reproducing the actions of Odysseus in the likeness of those of Leopold Bloom.

> He reconstructs an epic map as much as he charts the spaces of his native city. It is not only the general

[144] Ellman, *James Joyce, op. cit.*, p. 245, note 113.
[145] P. Gay, *Modernism: The Lure of Heresy*, William Heinemann Press, London, 2007, p. 100.
[146] Budgen, *James Joyce and the Making of the Ulysses, op. cit.*, pp. 67-68, note 132.
[147] Seidel, *Epic Geography, op. cit.*, note 126.

pattern of exile and homecoming that Joyce borrows from the Homeric Odyssey, but the placing, direction, timing, orientation, disorientation, and repetition of movement within a recognizable grid.[148]

Then in another part of the same book Seidel notes: "Even a cursory look at the Dublin map suggests that Joyce has reconstructed the Ithaca grid with some exactness in his own Nostos".[149]

But Joyce not only wished to reproduce the places of Dublin in a geographical sense, he was also interested in including the feature of time in his discourse. Joyce was as interested in accurately reproducing Dublin's map in his narrative as with the precision of the time's schedule, when in each chapter of the book a specific time is marked out. This can clearly be seen in both the schemes that he gave to his friends Carlo Linati and Stuart Gilbert by the beginning of the 1920s.[150] Geography and time deeply engaged Joyce as central themes of his narrative. "Among the patterns that permeate *Ulysses*, one finds not only the Homeric analogues and several other schematic elements, but also a perverse naturalism in the attempt to reproduce the geographical details of Dublin as well as the precision of the public, chronometric time of 16 June 1904".[151]

Joyce's topographical description and the use of a rhetoric of cartography is reflected in the characters who, through their monologues and dialogues, built up an entire map of Dublin.[152] With *Ulysses*, Joyce achieved a map of Dublin based on a narrative tradition instead of a cartographic one. The beginning of 'Ithaca', one of the last episodes of the novel, illustrates how Joyce achieves this:

> What parallel courses did Bloom and Stephen follow returning?
>
> Starting united both at normal walking pace from Beresford place they followed in the order named Lower and Middle Gardiner streets and Mountjoy square, west: then, at reduced pace, each bearing left, Gardiner's place by an inadvertence as far as the farther corner of Temple street: then, at reduced pace with interruptions of halt, bearing right, Temple street, north, as far as Hardwicke place. Approaching, disparate, at relaxed walking pace they crossed both the circus before George's church diametrically, the chord in any circle being less than the arc which it subtends.[153]

The combination of the speed of the paces, the places mentioned, and the actions of the characters amounts to a mapping of the city. The scheme is repeated through *Ulysses* several times, and the stories of the characters converge in a systematic description of Dublin.

This is especially true of "Wandering Rocks". Frank Budgen shows how geographical accuracy was one of Joyce's main aims in that chapter: "Joyce wrote the Wandering Rocks with a map of Dublin before him on which were traced in red ink the paths of the Earl of Dudley and Father Conmee. He calculated to a minute the time necessary for his characters to cover a given distance of

---

[148] Ibid., p.123.

[149] Ibid., p. 228.

[150] Ellman R. *Ulysses on the Liffey. op cit*. note 111.

[151] U. Kumar, *The Joycean Labyrinth: repetition, Time, and Tradition in Ulysses,* Clarendon, Oxford, 1991, p. 4.

[152] The rhetoric of cartography and its relationship with Joyce's book *Ulysses* is explored by Jon Hegglund in his article "*Ulysses* and the Rhetoric of Cartography", *Twentieth Century Literature*, 49, 2, 2003, pp. 164-192.

[153] Joyce, *Ulysses, op. cit.*, p. 1455.1, note 107.

the city ".[154]

As Jon Hegglund has remarked,[155] Joyce's ideas about maps could be a consequence of the attitude that in the Victorian age England had towards Ireland, where maps came to be seen as representations of the horizons of expansion and infinite knowledge: "Post-Enlightenment cartography imagined itself an ideal form of representation, a way to reduce the diverse knowledges of the world into an abstract image of clarity and scientific neutrality".[156]

For Joyce, cartography was somehow linked to the precision offered by a scientific practice. To some extent James Joyce thought of himself as a cartographer able to bring a certain order into the narrative world through words. The stories and images, the narrative that Joyce created, were supported by a sort of scientific observation, reinforced by all the references that can be found in the toponymy of *Ulysses*.

In 1923, Thomas Eliot already had a clear idea of what Joyce was achieving. In his essay "Ulysses, Order and Chaos" Eliot opposes Richard Aldington's position on James Joyce, who according to Eliot had 'treated Mr. Joyce as a prophet of chaos…'[157]. In Eliot's view what Joyce had achieved was exactly the opposite; a narrative based on an order, and well structured. Perhaps *Ulysses* was not a novel in a classical sense, but it is not necessary to give a definition to this 'new' way of writing about 'living material'.

> In using the myth, in manipulating a continuous parallel between contemporaneity and antiquity, Mr. Joyce is pursuing a method which others must pursue after him. They will not be imitators, any more than the scientist who uses the discoveries of an Einstein in pursuing his own, independent, further investigations. It is simply a way of controlling, or ordering, of giving a shape and a significance to the immense panorama of futility and anarchy which is contemporary history.[158]

This is the new expression of the narrative of the age, capable of providing order and control, of being more scientific than ever before, of being realistic to the very edge where the spatial descriptions are so precise that the reproduction of an entire city can be achieved, with Joyce even counting the paces and the exact time that the characters require to go from one place in the city to another. This is one of the central achievements of *Ulysses*, quickly understood by a chosen few among his contemporaries.

The cultural representation of a map of the beginning of the twentieth century is reflected in *Ulysses*. Hegglund, referring to Edney's[159] book argues:

---

[154] Budgen, *James Joyce and the Making of the Ulysses, op. cit.*, pp. 122-123, note 132.

[155] Hegglund, "*Ulysses* and the Rhetoric of Cartography", *op. cit.*, note 46.

[156] Ibid., p. 188.

[157] Eliot, T.S. *Ulysses, Order and Chaos* (1923). In *Selected Prose of T.S. Eliot*, edited by Frank Kermode. Faber and Faber 1975. p.175.

[158] Eliot T.S. *op cit.* p.177, note 157.

[159] M. Edney. *Mapping an Empire: The Geographical Construction of British India, 1765-1843*. Chicago: U of Chicago P, 1997.

As Edney puts it, "The space of the map was not bounded and limited but was extensible and as potentially all-encompassing as British power and knowledge could make it". The map, then, was both a synecdoche of the imperial archive and a grid for all of its data; it both represented and measured the British Empire.[160]

Joyce, due to the British Empire's dominion and its attitude to the mapping of Ireland, was born in a colonial context, essential to his understanding of the power that maps have for the description of a geographical space. Furthermore, he was a writer who understood mapping as an area of study able to give structure to narrative. Joyce's schemas given to his friends for a better understanding of his book reveal the intentions he had concerning the peculiar place of the reader within the complex maps offered by *Ulysses*:

> I think that in view of the enormous bulk and the more than enormous complexity of my three times blasted novel it would be better to send you a sort of summary – key—skeleton—scheme (for your personal use only). Perhaps my idea will appear clearer to you when you have the text... I have given only catchwords in my scheme but I think you will understand it all the same... It is also a sort of encyclopaedia.[161]

Throughout *Ulysses*, Joyce several times outlines the idea of a map for the understanding of the characters. At the beginning of 'Proteus', Stephen is first mapping the street where he is walking, and then he is feeling the passage of time through the space in which he is moving forward.

> Ineluctable modality of the visible: at least that if no more, thought through my eyes. Signatures of all things I am here to read, seaspawn and seawrack, the nearing tide, that rusty boot. Snotgreen , bluesilver, rust: coloured signs. Limits of the diaphane. But he adds: in bodies. Then he was aware if them bodies before of them coloured. How? By knocking his sconce against them, sure. Go easy. Bald he was and a millionaire, maestro di color che sanno. Limit of the diaphane in. Why in? Diaphane, adiaphane. If you can put your five fingers through it, it is a gate, if not a door. Shut your eyes and see.

> Stephen closed his eyes to hear his boots crush crackling wrack and shells. You are walking through it howsomever. I am, a stride at a time. A very short space of time through very short times of space. Five, six: the nacheinander. Exactly: and that is the ineluctable modality of the audible. Open your eyes. No. Jesus! If I fell over a cliff that beetles o'er his base, fell through the nebeneinander ineluctably. I am getting on nicely in the dark. My ash sword hangs at my side. Tap with it: they do. My two feet in his boots are at the end of his legs, nebeneinander. Sounds solid: made by the mallet of Los Demiurgos. Am I walking into eternity along Sandymount strand? Crush, crack, crick, crick.[162]

Through his eyes, ears and hands, we may understand not the spatial place Stephen is seeing, but his experience of narrating the mapping of this space, how through his senses he is recognizing Sandymount strand. The narrator in the third line of the first paragraph is introduced to continue the narration of Stephen's experience, a change in the point of view, from the character to the narrator. With the last sentence of the first paragraph and the beginning of the second, Stephen reminds us that it is not only the sense of sight that enables a human being to recognize a space, but also that the role of the ears and hands is fundamental for the acquisition of spatiality.

---

[160] Hegglund, "*Ulysses* and the Rhetoric of Cartography", *op. cit.*, note 46. p.171.
[161] Joyce, James. *Letters of James Joyce*. Gilbert Stuart [ed]. Faber and Faber. London, 1957. p.146.
[162] Joyce, J. *Ulysses*. *op. cit*. p. 75.1., note 107.

In 'Aelous' Joyce is mapping the visualization of the famous murder which had taken place in Dublin's Phoenix Park, as an example of an accurate description of a certain kind of perception.

A DISTANT VOICE

-I'll answer it, the professor said going.

-B is parkgate. Good

His finger leaped and struck point after point, vibrating.

-T is viceregal lodge. C is where murder took place. K is Knockmaroon gate.

The loose flesh of his neck shook like a cock's wattles. An illstarched dicky jutted up and with a rude gesture he thrust it back into his waistcoat.

-Hello? *Evening Telegraph* here…Hello?... Who's there? ...Yes…Yes…Yes…

-F to P is the route Skin-the-goat drove the car for an alibi. Inchicore, Roundtown, Windy Arbour, Palmerston Park, Ranelagh. F. A. B. P. Got that? X is Davy's publichouse in upper Leeson street.

The professor came to the inner door.

-Bloom is at the telephone, he said.

-Tell him go to hell, the editor said promptly. X is Burke's publichouse, see?[163]

The scene that is being narrated in these lines takes place within the telegraph office, and is part of a conversation where the exact place where the murder took place is being described. Myles Crawford is the one who is explaining to Lenehan how, via an advertisement published on March 17 in the 'Weekly Freeman' for Bransome's coffee, the coordinates where the actions took place can be recognised. Crawford is indicating to Lehnan not just the location of the murder, which was between the viceregal lodge and the Knnockmarron gate (both of them are specific places in Phoenix Park), but basing himself on the advertisement he explains the trajectory that the car, which was part of an alibi, followed. Based on the narration of these events, the reader is able to acquire a notion of how the events occurred, and imagine the places that the characters are describing. This yet another example of how Joyce is reproducing specific places, here Phoenix Park, by accurately describing the positions and the paths followed by the characters or given by the characters.

Joyce did not only think about the map that could be made with the sense of sight. He was aware of how blind people must also construct maps for the recognition of events. For example, in the chapter of 'Lestrygonians', Bloom is helping a blind man who is able to perceive where spatial objects are, according to the sounds he hears and what his hands can recognize. With this example Joyce emphasises the different possibilities a human being has to map space, possibilities not constrained by sight, but that can be developed through hearing.

So to describe space in *Ulysses*, Joyce used a variety of elements: the relationship between Dublin and the Mediterranean, the time schedule, the speed of the characters' footsteps, the

---

[163] Ibid. p. 285.657.

description of places, the British Empire and its conquest politics as well as the multiple ways in which human beings, basing themselves on their senses, can recognize their surroundings. All these elements helped Joyce to make of his narrative, of his cartography discourse, a scientific activity, as T.S Eliot was quick to notice soon after the publication of *Ulysses*.

I now want to show how the concepts of simultaneity, different viewpoints, and map converge into one main map in *Ulysses*.

1.4. *The Spatio-Temporal Map of* Ulysses

To understand the representation of space and time that Joyce wanted to achieve in *Ulysses*, one must focus on the concepts of parallax and simultaneity. One must further distinguish between two different kinds of events, in the first place events described in a clearly defined spatial place in which his characters find themselves, such as the scenes taking place in Sandymount strand, the national museum, Freeman's Journal, and any other of the places where the actions occur in *Ulysses*. I will call the actions that happen in these places micro events, and macro events those where more than one spatial location is described while the actions are taking place, for example episode 10 where Joyce's narrative makes it possible for us to think of actions developing in more than one place, because they are developed simultaneously in time.

Within *Ulysses* micro events, events occurring at the same spatial location, and macro events, events occurring at different spatial locations, are described. The former are events happening at the same time and in the same space, but as perceived by different characters. I will call this a "multiple consciousness map" because it is achieved with the interference of the thoughts and actions of several characters. This means that each character is simultaneously contributing to map an event from different points of view, from different perspectives. As we have already seen, the best example of this mapping in *Ulysses* is the chapter "Nausicaa".

The second kind of event refers to different situations happening at the same time but in different locations, which is the same as saying different spaces perceived by different characters. I will call this a "map of maps". This means that two (or more) different characters, simultaneously in time but in different places of the city, are mapping with their different narratives two, three or several situations, as happens in the first six episodes of the novel, and in the episode "Wandering Rocks". In an extensive perception, the characters achieve a comprehensive map of what is happening in, for example, the city of Dublin at the same precise moment.

For the "map of maps" I will specifically outline the scenes and the actions where these situations can be noticed in *Ulysses*. One of the biggest challenges to achieve this interpretation of space within Joyce's narrative is again the fact that the book, as a material object, is one-

dimensional, and, in order to tell parallel stories at the same time, Joyce had to develop a narrative technique where in a certain number of pages the perspective of one character is narrated and, in another set of pages, the same story is narrated but through the thoughts and eyes of other characters.

As already mentioned, the first six episodes of *Ulysses* are the representation of this map of maps, although the phenomenon often recurs throughout the book. Stephen Dedalus and Leopold Bloom moved simultaneously in the city of Dublin, and by the end of the day they had covered distances and places, which describe Dublin's geography. Stephen Dedalus starts from the southeast of the city, whereas Bloom from the northwest, and, after about two hours they arrive at the same place, Sandymount beach. One hour later, they will converge again in another place, the newspaper office. Furthermore, the contribution of the other characters will be determining for, 1), mapping the entire city of Dublin and, 2), mapping the city at the same precise moment, just as happens in "Wandering Rocks".

The "multiple consciousness map" and the "map of maps" converge in Joyce's narrative. The interior monologue is necessary for the creation of different perspectives—otherwise it would not be possible to know what the characters think while they are being part of particular scenes—as shown in the chapter "Nausicaa", where the same scene is narrated from the several perspectives offered by the two different characters. In this episode the reader becomes familiar with the thoughts and actions of both characters, Gerty and Bloom.

In this same chapter, Joyce is telling a story from different perspectives. Declan Kiberd points out that: "Most have seen the entire accompanying paragraph as Bloom's interior monologue, but it is rather an interweaving – so confident has Joyce become of his technical mastery – of two very different evaluations of the same experience and two consequently discordant discourses".[164]

So the map Joyce put together in *Ulysses* was not just another geographical representation of the *Odyssey*, but a new geographical perception, where the concepts of simultaneity and parallax were fundamental.

To sum up, the spatio-temporal map created by Joyce in *Ulysses* reflected a different geographical perception from what had previously been shown in narrative. This new kind of map combined in various ways the notions of simultaneity and parallax, where all the characters involved, with their thoughts and actions, contribute to the entire frame of the story.

The question I now want to address is: when did Joyce conceive such a spatio-temporal map? May the concepts involved in building such a map be linked to the scientific, mathematic and/or technological advances of the time? As will be seen in the next section, I suggest that Joyce's

---

[164] Kiberd in Joyce, *Ulysses*, *op. cit.*, p. 1086. note. 138.

spatio-temporal map was shaped during the second decade of the 20th century and, when it was in the final process of being structured, Joyce was significantly encouraged by the notions that Henri Poincaré had set out in his book *Science and Hypothesis*. Joyce was exposed to these ideas at the end of the 1910's, and he adopted them when in 1920 he moved to Paris, where Poincaré's ideas were still very current in cultural circles.

1.4.1. *The Origin of Joyce's Map*

Joyce started writing *Ulysses* around 1914, and finished it between seven or eight years later. In this period he moved into three different cities: Zürich, Trieste, and Paris. In fact, due also to World War I, Joyce in those years changed his address more than ten times.

As Michael Groden showed in *Ulysses in Progress*[165], the first nine chapters of *Ulysses* may be considered as representing the first stage of Joyce's writing, while the second stage includes the subsequent five chapters, and the last stage runs from the chapter 'Circe' until the end of the book. Each of these stages represents a specific feature that gave its form to the novel. The first stage represents the period when Joyce shaped the characters of the novel; the second stage was a bridging period for the last stage in which Joyce was deeply concerned with organization, form and structure. The second period and the last period are the most important for the purposes of this chapter because the second period is when Joyce gets involved in a cartographic discourse, whereas the third period will reflect Joyce's need to become familiar with the popular scientific ideas of the epoch.

Groden described how the 'artistic goals' of Joyce radically changed between the first stage and the third. The second stage, as Groden saw it, was permeated by conceptions that deeply modified Joyce's writing style. Groden devotes three chapters to emphasising these changes in narrative technique. For the early stage (1914-1918), he uses the episode of 'Aeolus'; for the middle stage (1918-1920) he uses the episode of 'Cyclops'; and for the last stage (1920-1922), he uses material from the last four episodes of *Ulysses*. As Groden put it: "To reach a point at which he could write episodes like 'Circe' and 'Ithaca', he needed to pass through a fairly long transitional stage of work. This middle stage involves five episodes--'Wandering Rocks', 'Sirens', 'Cyclops', 'Nausicaa', and 'Oxen of the Sun'".[166]

In the first stage, what can be seen is an initial narrative technique based on third-person, past-tense narration, free indirect discourse, first-person and present-tense monologue. The first radical change of style can be seen after "Scylla and Charybdis". In the beginning of the chapter

---

[165] M. Groden, *Ulysses in Progress*, Princeton University Press, Princeton N.J., 1977.
[166] Groden, *Ulysses in Progress*, *op cit.*, p. 37, note 165.

"Wandering Rocks" Joyce, as he already had early in the novel, gets into his characters' minds (interior monologue narrative technique). However, in this episode a process of variation within the structure of his narrative can be seen. This happened by the end of 1918, when Joyce explicitly mentioned he was finishing the first part of *Ulysses*.

According to Karen Lawrence, in the chapters of 'Wandering Rocks' and 'Sirens' there is a "breakdown of the initial style and a departure from the novelistic form of the book's first half."[167] From her point of view in the episode of "Wandering Rocks" there is a lack of synthesis, which causes an inability to establish connections—of time, logic or cause—of the narrated events. She mentions that even the simultaneity of events put forward by Clive Hart and David Hayman[168] is not well established by Joyce within the text. However she thinks that 'Time and space are the unifiers in the universe of the chapter: the characters moving through Dublin are related by *coincidence* in time and *proximity* in space.'

Groden is able to identify several narrative technique changes, as well as elaborate a chronological stage for each episode. According to him, the interior monologue technique was first used, and then replaced, and afterwards reconsidered again:

> The radical change in Joyce's writing - from characters to correspondences, from story to structure - did not occur suddenly, nor did he plan it in advance. Rather, as he worked on the episodes following 'Scylla and Charybdis', he first elaborated and played with the monologue technique; then he replaced the method with various parodic styles. After this work he was ready (even though, again, he was not aware of it) for the major new directions of his final stage of writing: the expansive, encyclopaedic concerns of the last four episodes, specially 'Circe' and 'Ithaca', and the elaborate revisions of the earlier episodes."[169]

The beginning of the year 1918 saw Joyce led to some new ideas, having already finished the 'Telemachiad' and also sketched the 'Nostos'. For example, the parallels between the geography of *The Odyssey* and Bloom's journey have their research origin in this period. The Zürich notebook (VIII.A.5) reveals the transcriptions Joyce made from Bérard's *Les Phéniciens*. While he was writing the chapters 'Calypso', 'Hades', 'Aeolus', and the 'Lestrygonians', Joyce re-read this book, as is conveyed in the recurrent allusions to it in his notebook; and in his notebooks for the first time there is a map of the Mediterranean. This is the bridging period Groeden recognised, when Joyce starts to conceive of a geographical approach for the development of his narrative.

Apart from his geographical studies, Joyce was also exploring the scientific ideas of his time in 1918. He was beginning to become familiar, directly or indirectly, with the view of science held by Henri Poincaré in *La Science et l'hypothèse,* originally published in 1902.

It is not yet possible to state categorically that Joyce had read the book, although as we will see,

[167] K. Lawrence. *The Odyssey of Style in ULYSSES.* Princeton University Press, 1981. p. 80.
[168] C.Hart and D.Hayman. *James Joyce's Ulysses: Critical Essays. op cit.* note 127.
[169] Groden, *Ulysses in Progress, op cit.*, p. 37, note 165.

there are several features of *Ulysses* leading us to believe that he was aware of Poincaré's ideas. As has been noted:

> Joyce had felt the necessity to update his scientific terminology and his view of modern physics, mathematics and astronomy around 1918, when he was preparing the 'Ithaca' episode of *Ulysses*, with its catechetic method, pseudo-rationality, absurd calculations and intense beauty. One passage in the preparatory Notesheets is interesting, for it links the themes of doubt, of absurdity and the logic of scientific discovery".[170]

The notesheets Rabaté is referring to include passages from Joyce like the following:

deal logically with the unknown

working hypothesis

reductio ad absurdum

prod. Elim. Of some elements of complexity

1) state of ignorance

2) respect for as yet unknown

3) never shrink absurd.[171]

In 1918 Poincaré's book was very well-known. Its first edition was in French, and in 1905 it was published in English. In France, after only ten years, more than 16,000 copies had been sold. By 1913 the book could be read in six different languages and had sold more than 20,000 copies. For Joyce it may have offered a basis, together with the ideas being circulated by Bertrand Russell in those same years, for his interest in the new scientific notions being addressed in early twentieth-century science. Phillip Herring, in his fine edition of Joyce's notes, showed how some of them might have been based on Russell's *Introduction to Mathematical Philosophy*:

> Joyce's notes on mathematics are an especially interesting feature of notebook V.A.2. In fact, some future Joyceans may best remember notebook V.A.2. not as the notebook compiled for the revision of the typescripts and proofs of *Ulysses* but as the manuscript containing Joyce's cribbings from Bertrand Russell… Russell's *Introduction to Mathematical Philosophy* (London, 1919) must be reckoned as an important influence on the penultimate chapter of *Ulysses*.[172]

The subsequent pages of Herring's book show the interaction between Joyce and Russell in detail. Concerning the relation between Russell and Poincaré's ideas, Russell strongly criticized Poincaré's philosophy of science. Three main points were stressed by Russell: 1) He opposed Poincaré's idea of conventions:

> Experience leaves us our freedom of choice, but it guides us by helping us to discern the most convenient path to follow. Our laws are therefore like those of an absolute monarch, who is wise and consults his council of state. Some people have been struck by this characteristic of free convention which may be

---

[170] J.-M. Rabaté, *Joyce Upon the Void: The Genesis of Doubt*, St. Martin, New York, 1991, p. 1.

[171] As quoted in P. Herring (ed.), *Joyce's Ulysses notesheets in the British Museum*, The University Press of Virginia, Charlottesville, 1972, p. 455.

[172] P. Herring (ed.), *Joyce's Notes and Early Drafts for Ulysses: Selection from the Buffalo Collection*, The University Press of Virginia, Charlottesville, 1977, p. 49.

recognised in certain fundamental principles of sciences. Some have set no limits to their generalisations, and at the same time they have forgotten that there is a difference between liberty and purely arbitrary.[173]

For Russell, conventions could not be the only thing capable of defining scientific grounds, whereas for Poincaré it was the departure point. 2) Russell disagreed with the idea of probabilities, for the greater certainty it could provide concerning natural phenomena; to Poincaré this was the most we could know about nature. 3) The relativistic aspect Poincaré gave to space.

> Space is another framework which we impose on the world. Whence are the first principles of geometry derived? Are they imposed on us by logic? Lobatschewsky, by inventing non-Euclidean geometries, has shown that this is not the case. Is space revealed to us by our senses? No; for the space revealed to us by our senses is absolutely different from the space of geometry. Is geometry derived from experience? Careful discussion will give the answer—no! We therefore conclude that the principles of geometry are only conventions; but these conventions are not arbitrary, and if transported into another world (which I shall call the non-Euclidean world, and which I shall endeavour to describe), we shall find ourselves compelled to adopt more of them.[174]

Poincaré conceived space as a purely psychological construction. This conviction was based on the recent mathematical developments of Nikolai Lobachevski (1792-1856) and Bernhard Riemann (1826-1866), which showed the possibility of other geometries, different from that proposed by Euclid. These mathematical achievements offered a new way to interpret space. For Poincaré, it was not necessary to assign a certain and specific geometry to define space. Russell, on the other hand, supported a more strictly logical (instead of a psychological) necessity in dealing with the concept of space.

Concerning Joyce's interaction with these ideas, it is worth remembering that he was able to abstract them, as in the pages of his *notesheets* for the chapter of "Ithaca", where he wrote:

> Eucl. Space no total curvature of spine (Milly)
>
> Lobatschewsky const. Tot. curv. Neg
>
> Riemann   ...   pos.[175]

As mentioned above, these notes are some of the notes used by Joyce for the chapter "Ithaca". However, an important amount of the last three chapters were written years before the actual immersion of Joyce in the writing of these chapters, which was at the end of 1920.

> He always said that he had drafted the last three episodes very early in the writing of the book (in mid-1920 he wrote that "a great part of the Nostos or close was written several years ago"; Letters, I, 143), and the notebook provides support for this connection, since it shows him taking notes for the entire book at once, even while he was writing specific early sections. (This should not suggest, however, that his plans for the later episodes were very far advanced at this stage in his work. He probably had no idea that the later episodes would differ at all from the ones he was then writing.)[176]

The importance of his reading was going to be crucial for the change of perception Groden

---

[173] Poincaré. *Science and Hypothesis. op cit.* p.XXIII, note 108.
[174] Ibid. p. XXV.
[175] Herring (ed.). *Joyce's Ulysses Notesheets in the British Museum. op cit.* p. 474. note 171.
[176] Groden, *Ulysses in Progress, op. cit.*, p. 77, note 165.

recognised. At the beginning of the year 1919, Joyce was starting to write the chapter "Wandering Rocks". From this chapter on, in each episode of *Ulysses,* the conception of simultaneity (in "Wandering Rocks"), parallax (in "Nausicaa"), as well as the concept of mapping (the beginning of "Ithaca"), can be seen to be at work.

A chronological description of when the chapters were written will give a better view of how *Ulysses,* from this stage onwards, was being developed. "Wandering Rocks" was written in the first months of 1919, "Cyclops" was written in Zürich, and "Nausicaa" in Trieste, and they were developed in the summer and last months of that same year respectively.

By the beginning of 1920 the chapter "Oxen of the Sun", had been written in Trieste, and from 18 May to 20 December of that year "Circe" was written, partly in Trieste and partly in Paris. "Eumaeus" began to be conceived in the last months of 1920, and completely finished by 16 April 1921. "Ithaca" and "Penelope" then started to be developed, and they were partly finished by the autumn of that year. The last episode to be written was "Ithaca": Joyce finished it by 29 October, whereas "Penelope" was finished one month before, on 24 September. These three last chapters were all finished in Paris. It is important to outline the chronology of the developments of the episodes because it shows that Joyce was finalizing the structure formed by his ideas on the concepts of parallax, simultaneity, and especially the idea of cartography that he wanted to exploit in *Ulysses*. Furthermore, living in an entirely different atmosphere, because he arrived in Paris in 1920, he finished not only *Ulysses* but also the spatio-temporal map structure within the novel. Perhaps his arrival in Paris allowed him to think of how to achieve the structure he was looking for.

Joyce did not write the episodes and then leave them without further alteration. As a matter of fact, after the publication of the episodes in the *Little Review*, Joyce continued to alter his episodes. The last versions of the chapters, the ones that later on became *Ulysses*, were completely different if compared with the first publications.

> Joyce apparently used a few notes for the original versions of the episodes and then regularly returned to the notebook for his revisions and augmentations of 1920 and 1921. (He read the notebook when he compiled the notesheets for the last seven episodes; over 50 of the notes reappear on the sheets, bunched mainly on "Cyclops" 7, "Nausicaa"6, and specially "Circe" 3:100-21.) Despite all this, there are surprisingly few specific uses of these notes in the book."[177]

For the purposes of this chapter, there is one clear example where the late interest he had in the ideas of simultaneity, parallax and mapping can be seen.[178]

What is relevant from this section of my work is that, in the period from 1918 to 1920, Joyce

---

[177] Ibid., p. 77.

[178] "Most of the 'Circe' notes, like these for the two pages of dialogue, went into his elaborate augmentation of the episode; an example of this is the pair of notesheets, 'Circe' 20 and 21, where Joyce listed all the 'characters' who had appeared thus far in *Ulysses* to assure their inclusion in 'Circe'. The characters included concepts like 'Parallax' ('Lestrygonians') and subjects of previous discussion, such as 'Beresford' ('Cyclops')", Ibid., p. 175.

profoundly altered some of his concepts as well as the narrative structure of *Ulysses*.

1.5. 'Science and Hypothesis' *and James Joyce*

According to Ronald McHugh the mentioning of Lobachevsy and Riemann in Joyce's notes must be due to his readings of *Science and Hypothesis*: 'In that of Riemannian geometry it is convex, possessing a 'constant positive curvature'. Joyce might have learned about this from Henri Poincaré's *La science et l'hypothèse* (1912), for Poincaré was a popularizer of innovations…'[179] Jean Rabaté is also sure when mentioning Joyce's notes for 'Ithaca' that he is: '…taking notes from a book or an encyclopaedia which reproduces the theories of Henri Poincaré, whose *La Science et l'hypothèse* (published in 1902) was extremely influential at the time, and triggered a controversy with Bertrand Russell.'[180]

Furthermore, according to Thomas Jackson Rice even the portrayals of Dedalus and Bloom denote certain features revealing Joyce's knowledge of Poincare's ideas, even years before. Because in the case of Stephen Dedalus, Jackson refers to some comments in *A Portrait of the Artist as a Young Man*: 'Joyce would have been aware of Poincaré's reputation and very likely knew something of his "conventionalist" philosophy; Stephen Dedalus's view of the doctrinal system of Roman Catholicism as "an absurdity which is logical and coherent"… distinctly echoes Poincaré's assertions in *Science and Hypothesis*,…'[181]. And in the case of Bloom, Jackson says that Bloom is the kind of person who could be interested in Poincaré's book: 'Books like Ball's *Mathematical Recreations* and Poincaré's *Science and Hypothesis*, presumably capitalizing on a large audience that, like Leopold Bloom of *Ulysses*, was interested in improving its knowledge of technical and scientific subjects,…'[182]

Furthermore, James Joyce has been related to the figure of Henri Poincaré through chaos theory. In the work of Thomas Jackson Rice and Peter Francis Mackey[183], Poincaré's ideas appear as important departing points for Joyce's development of notions regarding chaos, which were included in *Ulysses* and *Finnegan's Wake*.

As mentioned above, whether James Joyce actually read Poincaré's *Science and Hypothesis* has not been proved. If one compares *Ulysses* and Poincaré's book, however, one can find outstanding convergences, especially concerning the concepts of simultaneity, parallax, and space. It seems likely that by this period Joyce had already had contact with the ideas in Poincaré's book, and that part of the space and time ideas he developed in *Ulysses*, especially in the last chapters, were

---

[179] McHugh, Ronald. *The Sigla of Finnegan's Wake*. London. 1976. p.75.
[180] J.-M. Rabaté. *Op Cit*. p. 1, note 170.
[181] Thomas Jackson Rice. *Joyce, Chaos and Complexity*. University of Illinois, 1997. p. 163.
[182] Jackson T. *op cit*. p. 164, note 181.
[183] Mackey Peter Francis. *Chaos Theory and James Joyce's Everyman*. University Press of Florida. 1999.

encouraged by his readings of Poincaré.

Poincaré wrote his book for an audience which was not well acquainted with the scientific discourse of the epoch. In part one, he dealt with mathematics and its principles; in part two, with space, geometry and its relationship to our perception of nature; in part three, he addressed the themes of mechanics, motion and energy; and finally, in part four, he addressed physics, its relationship with mathematics, probabilities, optics, electricity, and electro-dynamics.

Poincaré discussed the relative position that can be perceived between objects when the perspectives or viewpoints change from object to object, and the issue of a common or absolute orientation in space: "And among the data which enable us to define this position we distinguish the mutual distances of these bodies that define their relative positions, and the conditions which define the absolute position of the system and its absolute orientation in space."[184] Poincaré's idea regarding the 'absolute position of the system and its absolute orientation in space' may be compared with the chapter "Wandering Rocks", where, due to the eighteen different wanderings, it is possible to conceive of an entire, absolute image of the city simultaneously.

As is explained by Kenner, based on the narrative techniques he developed in *Ulysses*, Joyce was representing the actions without a particular point of view. He was not that interested in picturing just an individual, subjective perspective.

> He needed to write something with no point of view, no narrator, whatever: something wholly "objective": something in which the only point of view would be that of the spectator, making what can be made of the characters when nothing is accessible but their speeches and their behavior. What happens when the storyteller gets as far outside his story as that?[185]

The idea of simultaneity and how he arrived at it was crucial for Poincaré. At the beginning of part three of his book, he gave an explanation for the relationship of time, space, and simultaneity. He made three points, which - I think - are crucial also for the representation of simultaneity in *Ulysses*:

> 1. There is no absolute space, and we only conceive of relative motion; and yet in most cases mechanical facts are enunciated as if there is an absolute space to which they can be referred.

> 2. There is no absolute time. When we say that two periods are equal, the statement has no meaning, and can only acquire a meaning by a convention.

> 3. Not only have we no direct intuition of the equality of two periods, but we have not even direct intuition of the simultaneity of two events occurring in two different places.[186]

Point three is central for our discussion, not because Joyce followed it, but because to a certain extent Joyce's narrative conceived of what Poincaré was announcing as not achievable. He created the possibility of "simultaneity of two events occurring in two different places". Recalling Michael

---

[184] H. Poincaré. *Science and Hypothesis*. *op cit*. pp. 75-76, note 108.
[185] Kenner H. *op cit*. p. 24, note 119.
[186] Poincaré, *op. cit*. p. 90. note 108.

Groden on the first six chapters of *Ulysses*, Stephen Dedalus and Leopold Bloom are pictured simultaneously. Among the changes Joyce made in the last period before the publication of *Ulysses,* Groden mentioned that this parallelism had not been planned, and was introduced after 1920.[187]

Coming back to the similarities between Poincaré and Joyce, the concept of parallax offers an example. It is mentioned by Poincaré on referring to how the non-Euclidean geometry discovered by Lobachevski would change the infinite condition of the parallax of a distant star. Poincaré summarised in five points why geometry could not be proved by experimental facts. On point three Poincaré spoke about non-Euclidean geometry as follows: "3. Geometry and Astronomy - The same question may also be asked in another way. If Lobatschewky's geometry is true, the parallax of a very distant star will be finite".[188]

In *Ulysses* Leopold Bloom, in the chapter "Ithaca", reflects on astronomical phenomena:

With what meditations did Bloom accompany his demonstration to his demonstration to his companion of various constellations?

Meditations of evolution increasingly vaster: of the moon invisible in incipient lunation, approaching perigee: of the infinite lattiginous scintillating uncondensed milky way, discernible by daylight by an observer placed at the lower end of a cylindrical vertical shaft 5000 ft deep sunk from the surface towards the centre of the earth: of Sirius (alpha in Canis Major) 10 lightyears (57,000,000,000,000 miles) distant and in volume 900 times the dimension of our planet: of Arcturus: of the precession of equinoxes: of Orion with belt and sextuple sun theta and nebula in which 100 of our solar systems could be contained: of moribund and of nascent new stars such as Nova in 1901: of our system plunging towards the constellation of Hercules: of the parallax or parallactic drift of socalled fixed stars, in reality evermoving from immeasurably remote eons to infinitely remote futures in companion with which the years, threescore and ten, of allotted human life formed a parenthesis of infinitesimal brevity.[189]

If we compare parallax conditions, we can see how Joyce's interpretation was in accordance with a finite quality of the phenomenon, just as Poincaré had mentioned what happened with the adoption of non-Euclidean geometry.

It is intriguing to realize how Joyce's narrative altered the shape of Poincaré's ideas on space, and how he used different perspectives to give us a more accurate perception of different events and situations. Poincaré's idea on how a common image could be constructed by moving from different perspectives is in accordance with the one developed by Joyce in "Nausicaa": "The images of external objects are painted on the retina, which is a plane of two dimensions; these are perspectives. But as eye and objects are movable, we see in succession different perspectives of the same body taken from different points of view".[190]

---

[187] "The exact parallelism in the episodes was apparently a late idea, since in the schema Joyce sent to Carlo Linati in September 1920 'Proteus', takes place between 10:00 and 11:00 a.m., whereas 'Hades' occurs between 11:00 a.m. and noon; Linati Schema.", Groden, *Ulysses in Progress, op. cit.*, p. 30, note 59. As will be recalled, in the schema of Stuart Gilbert the episodes "Proteus" and "Hades" are already marked as occurring at the same time.

[188] Poincaré, *op. cit.*, p. 75, note 108.

[189] Joyce, *Ulysses, op. cit.*, p. 1539.1040, note 107.

[190] Poincaré, *op. cit.*, p. 68. note 108.

And Poincaré continued: "We thus understand how these perspectives gave rise to the conception of three dimensions, although each perspective is only two dimensions,—because they succeed each other according to certain laws...We can even draw several perspectives of the same figure from several different points of view".[191]

This is how, in *Ulysses,* each perspective - for example those of Bloom and Gerty in "Nausicaa" - is needed to recreate the entire scene. Or, for example, in the scene of Bloom and Stephen returning to Bloom's house, at the beginning of "Ithaca", the images provided by Joyce are the account of several perspectives provided by the various characters. Joyce's descriptions seem to be in two dimensions due to the effect produced by the characters' movement. However, the full picture provided by the scene will not be in two dimensions, but will become the entire space where the action is taking place.

Joyce's idea of mapping space from different perspectives, as displayed in *Ulysses,* runs in parallel with the ideas described by Poincaré in his book *Science and Hypothesis*.

Conclusions

In this chapter I have emphasised the concerns Joyce had with the topics of time and space as represented in *Ulysses,* focusing particularly on the concepts of map, simultaneity, and multiple viewpoints.

Simultaneity, as Joyce saw it, included three different situations: the simultaneity of thought and action of one character; simultaneity of thought and action of several characters in the same spatial field; and the simultaneity of events happening to different characters spatially apart from each other.

What Joyce wanted to achieve with his narrative was the fullest description of a given situation, a more accurate picture of the actions taking place in the narrative. He wanted to show not just one narrative perspective which could be that of the hero or the narrator, but as many perspectives as possible to achieve a more realistic understanding of the events. The concept of multiple viewpoints was fundamental to that purpose, and the notion of parallax was associated with it. For this purpose, Joyce repeatedly used the word parallax to refer to the idea of different viewpoints. In Joyce's strategy, the psychological dimension regarding how other people regard us was also involved.

Cartography, I have shown, was another field with which Joyce interacted closely while working on *Ulysses*. His interest in cartography is well documented especially by his friend Frank Budgen, who emphasized how Joyce had aimed at fully representing Dublin in his novel. Thus, Dublin and the Mediterranean contributed to shaping *Ulysses'* complex geography in space and time. Joyce's

---

[191] Ibid., p. 69.

characters, with their monologues, dialogues, and the pace at which they moved through the city further added to the map by playing a fundamental role.

It could be claimed that *Ulysses* is a narrative map, in which the narrator is constantly involving the reader.

But Joyce's map was not an ordinary map: the proposed map conveyed both space and time. Here the concepts of simultaneity and multiple viewpoints played a major role. Furthermore, it included two different layers, focusing on micro and macro events respectively, which I have called the "multiple consciousness map" and the "map of maps". The former refers to a situation where the actions and thoughts of several characters were narrated and, with their experiences, a mapping of the situation is achieved. The latter involves several situations spatially apart from each other, but occurring exactly at the same time.

As to the origins of Joyce's spatio-temporal map, I have suggested that one of the possible sources used by Joyce to achieve the desired structure—the one mentioned by Groden which involves the last chapters of *Ulysses*—may well be Poincaré's book because some spatio-temporal theory in Henri Poincaré's *Science and Hypothesis* can also be seen in some of the last episodes of *Ulysses*, e.g. 'Wandering Rocks', 'Nausicaa' and 'Ithaca'.

Although we have no definitive proof that Joyce read the book, many scholars have argued for the possibility that he had read and was aware of Poincaré's ideas when developing the last episodes of *Ulysses*, and by 1918-1920 the ideas developed in the last chapters run in parallel with some spatio-temporal descriptions that Poincaré had developed in *Science and Hypothesis*. In these chapters Joyce seems to share and be well aware of several concepts Poincaré had discussed in his popular book, including the notions of simultaneity, multiple viewpoints, and parallax.

In those years, in fact, Joyce was constantly revising the texts he finally published as *Ulysses*. After first publication in the *Little Review*, he often came back to introduce changes to what later on became the chapters of his masterpiece. The notions of simultaneity, mapping, and multiple viewpoints were in some cases added around 1918-20, as I have shown focusing on the chapter 'Circe', where the idea of parallax was clearly added, possibly due to his interaction with the ideas circulated by Poincaré.

To think that Joyce by only interacting with the scientific ideas of his epoch achieved the spatio-temporal map presented in this chapter is to make a mistake. It is not possible to frame the very many, if not of course infinite, factors that might have contributed to the ways Joyce acquired his ideas. It is possible however, as has been done, to explore the significance of one of them.

If Joyce did not base his spatio-temporal intuitions on his readings of Poincaré, then he developed a narrative in accordance with some of Poincaré's ideas independently. Poincaré's book

was a popular scientific book that in the decade of 1910s had, as has been said a great success with the public. The explanation of this phenomenon would be a case study to be explored by the field of Science and Technology Studies. It will be remembered that Joyce had just arrived in Paris, where he worked on and finished *Ulysses* from 1920 to 1922, and in many ways the Parisian cultural context, which was still pervaded by Poincaré's ideas though his book was nearly twenty years old, was important for him. If this is the case, this atmosphere was fundamental for Joyce's recognition of the connection between the concepts of simultaneity and parallax, and their relationship to cartography.

For sure, the spatio-temporal map Joyce developed in *Ulysses* is a complex narrative structure that deserves further study. To track the conceptions of simultaneity, parallax, and mapping in *Ulysses* amounts in any case to pointing to a crossroads, where several different disciplines met: disciplines such as mathematics, astronomy, modern physics, cartography, the philosophy of science, and technology. Joyce's spatio-temporal map was indeed part of an entire culture, in which science and technology played major roles.

Chapter 2

Woolf's 'Spatio-Temporal Map'.

This chapter deals with how Virginia Woolf, by using the concepts of simultaneity, multiple points of view and maps as tools for description, created a structure within her narrative that I call a 'spatio-temporal map'. The chapter will set out some of the factors of the various areas of study having to do with Woolf's recognition of the above mentioned concepts for the development of her narrative structure.

This 'spatio-temporal map' allowed her to achieve a more accurate representation of the space and time in which the characters of the novels and the short stories, which she had written by the second decade of the 20th century, develop the on-going action. The inclusion of these three different concepts into her narrative allowed Woolf to achieve something that she was looking for after 1920: a narrative that could be closer to how events and actions develop in reality.

> The day after my birthday; in fact I'm 38. Well, I've no doubt I'm a great deal happier than I was at 28; & happier today than I was yesterday having this afternoon arrived at some idea of a new form for a new novel. Suppose one thing should open out of another—as in An Unwritten Novel—only not for 10 pages but 200 or so—doesn't that give the looseness & lightness I want: doesn't that get closer & yet keep form & speed, & enclose everything?[192]

In a sense, the 'spatio-temporal map' that Woolf constructed is a narrative structure that permitted her to achieve this closeness to reality, able to 'enclose everything'. There were several subjects from which Woolf could obtain insights to occupy the ideas of simultaneity, multiple points of view and maps, though this chapter will be centered only on specific aspects of the philosophy, science and technology of the age, fundamental for the recognition of these ideas and for what they contribute to Woolf's narrative.

This chapter will be focused on the period between 1920 and 1930, when Virginia Woolf wrote some of her most representative novels and short stories, developing narrative strategies reflecting her concerns with fields of knowledge such as physics, astronomy and philosophy, which were in a period of transition even over their most basic definitions. In a general sense, Woolf established a robust dialogue with the philosophical, scientific and technological ideas explored in her epoch, and were being modified due to contemporary research. In some cases the interpretation she gave in her narrative to certain concepts of these areas of study was not entirely accurate. Nevertheless, the interaction these fields of knowledge had with her narrative, clearly re-directed the way her short stories and novels were written.

---

[192] Woolf Virginia. *The Diary of Virginia Woolf. Volume Two 1920-1924*. Edited by Anne Olivier Bell. The Hogarth Press. London, 1978. p.13.

'The Mark on the Wall'[193] indicates the beginning of a new tendency in the way Virginia Woolf approached the narration of events. From this short story onwards, it can be noticed a strong interest in Woolf for themes such as simultaneity, and multiple points of view can be seen, as well as for the concept of maps not just as a geographical spatial description. Woolf developed these ideas in several of her short stories and in some of her novels, more intensively in the period from 1922 until 1930.

Although this is the main period that will be considered, it is not easy to frame a period of time without excluding important events in the life of a person. In Woolf's case, the 2nd decade of the 20th century is fundamental for the development of the ideas within her short stories and novels of the 1920s.

The first part of the chapter will be devoted to the development of the ideas of multiple points of view, simultaneity and map that Virginia Woolf developed mainly in the decade of the 1920s within her narrative.

In the second part a link will be established between the development of these ideas with the events, people and readings engaging Virginia Woolf in the decades of the 1910s and 1920s. Scholars such as Michael Whitworth, Ann Banfield, Gillian Beer and Holly Henry have emphasized the ideas of simultaneity, multiple points of view and mapping within Woolf's literature.

In 2000 Ann Banfield's book *The Phantom Table: Woolf, Fry, Russell and the Epistemology of Modernism*[194] was published. In it, the relationship between the philosophy of Bertrand Russell and Virginia Woolf's narrative is outlined. Banfield situates Woolf in an atmosphere concerned with the philosophy of the epoch. By presenting how Woolf from time to time attend the lectures given by Russell and taking the figure of Roger Fry as an essential connector for Woolf's recognition of Russell's discourse, Banfield to some extent relates images of books such as *To the Lighthouse* with Russell's ideas such as multiple points of view. In this chapter the ideas presented by Banfield concerning the concept of multiple points of view, which were a part of Russell's philosophy and which Woolf to a certain extent achieved an interpretation of, will be of particular interest.

In her book *Virginia Woolf and the Discourse of Science: The Aesthetics of Astronomy*[195] (2003), Holly Henry recognized the way in which Virginia Woolf's narrative was interconnected with the popular astronomy of the 1920s and 1930s. She also writes about how Woolf, by becoming involved with popular scientific personages of the epoch such as James Jeans and Arthur Eddington, developed a new understanding of space. Regarding this, the motor car also led Woolf

---

[193] It first appeared in *Two Stories* (1917).

[194] Banfield Ann. *The Phantom Table: Woolf, Fry, Russell and the Epistemology of Modernism.* Cambridge University Press. 2000.

[195] Holly Henry. *Virginia Woolf and the Discourse of Science: The Aesthetic of Astronomy*. Cambridge University Press. 2003.

to a new idea of the map of the world and the idea that human beings could have of it. In the article of Makiko Minow-Pinkney 'Virginia Woolf and the Age of Motor Cars'[196] it can be seen how the motor car came to provide new ideas of space for Woolf, and how this new configuration can be seen in her writings at the end of the 1920s.

Gillian Beer is one of the scholars who has worked the most on Virginia Woolf's cultural studies. Her book *The Common Ground*[197], as well as several articles such as ''Wireless': Popular Physics, Radio and Modernism'[198], have revealed various perspectives on the relationship between Woolf and the scientific and technological discourse of her epoch. So in this chapter Woolf's relationship with James Jeans and Arthur Eddington, and her recognition of the airplane and motor car as 'emblems of modern life', will be taken into consideration.

In his book *Einstein's Wake*[199], Michael Whitworth considers the relation of Einstein's Theory of Special Relativity (1905) and the Theory of General Relativity (1916) with the literature of the beginning of the 20th century. Of special interest in Whitworth's study for this chapter is the idea of simultaneity—fundamental for the development of Einstein's theories—which Whitworth considers in the chapter 'Simultaneity: A Return Ticket to Waterloo' of his book.

As can be seen, each of the above-mentioned scholars has already shown how these concepts were part of a cultural milieu, and were enclosed in the discourse of various human activities, from philosophy and painting to science and technology. Furthermore, they have mentioned the way in which Woolf acquired these ideas, outlining how she introduced them into her narrative, and they have also shown how Woolf explored and exploited them. In the second part of the chapter I will track the path these authors followed to tackle those themes.

The third part of the chapter will develop the idea of a 'spatio-temporal map' within Virginia Woolf's narrative as the intersection of these three concepts. By taking into consideration her idea of: multiple points of view, understanding of space, and simultaneity, as addressed by Banfield, Henry and Minow-Pinkey, and Whitworth respectively, we will be able to set out the idea of 'spatio-temporal map'. The main purpose of this chapter is to outline it as a fundamental structure within Woolf's narrative, so I will frame Woolf's development of the 1920s and show the atmosphere that surrounded her in a specific period of time where her narratives underwent a major transformation in form and content with regard to those ideas.

---

[196] Minow-Pinkney Makiko. 'Virginia Woolf and the Age of Motor Cars'. In In *Virginia Woolf in the Age of Mechanical Reproduction*. Edited by Pamela L. Caughie. Garland Publishing. 2000.

[197] Beer Gillian. *Virginia Woolf: The Common Ground*. Edinburg University Press. 1996.

[198] Beer Gillian. ''Wireless': Popular Physics, Radio and Modernism'. In *Cultural Babbage: Time, Technology, and Invention*, Ed. Francis Spufford and Jenny Uglow (London, 1996).

[199] Whitworth Michael. *Einstein's Wake: Relativity, Metaphor, and Modern Literature*. Oxford University Press. Oxford 2001.

2.1. *Multiple Points of View*

The first four writings of Virginia Woolf where the idea of multiple points of view is reflected are her short stories of the end of the 1910s: 'The Mark on the Wall' first published in July 1917, 'Kew Gardens', first mentioned in a letter from Katherine Mansfield to Virginia Woolf from New Zealand in 1917, and published in May 1919, 'An Unwritten Novel' first mentioned on 26 January 1920 and published in the *London Mercury* in 1920 and finally, 'Solid Objects' published in 1920. Although it can be seen that the idea of multiple points of view that she was starting to develop in these short stories is the basis for her subsequent novels and short stories, this chapter will be focused on what she developed in the 1920s.

Chronologically, the next piece of work where Virginia Woolf develops the idea of multiple points of view is *Jacob's Room*. On April 10 1920 she decided to start writing her third novel (*The Voyage Out* and *Night and Day* were published in 1915 and 1919 respectively) and by 4 November 1921, she finished the first draft. The novel was finished in July 1922 and was published 21 October 1922.

Hitherto Woolf had not developed the idea of multiple points of view in a novel. However, in *Jacob's Room* there is what she called a 'new form' of narrative, a "new form for a new novel."[200] One of the most important characteristics of this new narrative is the way in which the main character Jacob Flanders is described; every other character in the book says something about Jacob's personality and characteristics, only occasionally is Jacob the one contributing to his own description.

In this description, the main character is portrayed by the multiple points of view of the other characters. What can be known about Jacob is only possible through the words of the other characters. The characters that speak about Jacob are constantly changing from one to another, so an accurate description of him is not possible due the multiplicity of differently generated images of Jacob. " Jacob's room is thus less seen from within by Jacob than from without – by the novel's narrator – "observer of external sights down below" (JR, 50), the only of Woolf's novels to have one, or by other characters."[201]

One of the biggest challenges of the plot is this changing points of view, first on the perception of human beings, and then on the perception of how a story can be told. We necessarily know Jacob not by what he thinks about himself, as usually had happened in the narrative discourse, but by the impressions of other people. What Virginia Woolf showed with *Jacob's Room* is an aspect that narrative had not considered up until then because normally, when we learn the personal

---

[200] Woolf Virginia. *op cit*. note 192.
[201] Banfield, Ann. *op cit.* p. 331, note 194.

characteristics of people, we do not only know them by what they are able to tell us, but also by what other people can tell us about them. The title of the book reveals Woolf's main concern; i.e. Jacob's room and not Jacob himself:

> The emphasis in *Jacob's Room* is on the room, not on Jacob, on symptoms, not persons. This is one of the reasons why, in the process of revision, Virginia removed pieces of information which could be considered psychological or biographical. The reader is asked to look at Jacob from the outside (although, strangely enough, the reader is not really told what he looks like). It is as if Virginia had turned Lytton's biographical principles inside out: she avoids the person and turns to his things.[202]

In *Jacob's Room* each character involved is considered as a possible perceiver of the situation. Each of them has a role in the narration of events to construct an entire perception of the space and the situations experienced by the characters. This is a constant repetition throughout the book.

Mrs Dalloway was first published in May 1925 but started to be conceived three years before, between June and September 1922, after Woolf had written the short story 'Mrs Dalloway in Bond Street'.

One of the differences between *Mrs. Dalloway* and *Jacob's Room* is that in the case of *Jacob's Room*, the reader does not become familiar either with Jacob's human characteristics or with outside events through Jacob's own descriptions. Even the narrator since the beginning of the story says that one of Jacob's characteristics was the silent person he was "But whether this is the right interpretation of Jacob's gloom as he sat naked in the sun, looking at the Land's End, it is impossible to say; for he never spoke a word"[203]. Instead in *Mrs Dalloway* Woolf—by using the 'interior monologue', the 'free indirect discourse', and an omniscient narrator—provides the reader with a description of Clarissa, the main character. The narrated events can be memories of the past, actions taking place in the present, or both at the same time. At the beginning of the book Clarissa is opening the windows, then she starts noticing the morning, and starts thinking about Peter Walsh:

> How fresh, how calm, stiller than this of course, the air was in the early morning; like the flap of a wave; the kiss of a wave; chill and sharp and yet (for a girl of eighteen as she then was) solemn, feeling as she did, standing there at the open window, that something awful was about to happen; looking at the flowers, at the trees with the smoke winding off them and the rooks rising, falling; standing and looking until Peter Walsh said, "Musing among the vegetables?—was that it?—"I prefer men to cauliflowers"—Peter Walsh. He would be back from India one of these days, June or July, she forgot which, for his letters were awfully dull; it was his sayings one remembered; his eyes, his pocket-knife, his smile, his grumpiness and, when millions of things had utterly vanished—how strange it was!—a few sayings like this about cabbages.[204]

In both books the reader comes to learn about the principal characters, although in *Mrs Dalloway* Clarissa's thoughts are part of the dialogues whereas in *Jacob's Room*, Jacob almost never contributed to his own image. Nonetheless, in both novels the concept of multiple points of view is

---

[202] King, James. *Virginia Woolf.* Penguin Books. 1994. p. 316.
[203] Woolf, Virginia. J*acob's Room*. Penguin Books. 1992. p. 40.
[204] Woolf, Virginia. *Mrs Dalloway*. Introduction by Elaine Showalter. Penguin Books. 2000. p. 3.

there.

Mrs Dalloway's narrative gets closer to reality in the sense that hitherto, Woolf had never before used both techniques (the 'interior monologue' and an omniscient narrator) to narrate a story. That is, Virginia Woolf in this novel confronted the outside and inside image of the characters. The reader constantly learns about the characters not only through their own thoughts but also through the thoughts of the other personages of the story. The characters continuously change around and give their own particular points of view.

Clarissa's thoughts and actions, as well as other perceptions of her personality deriving from different characters, compose the novel. Clarissa then is a character who not only speaks about herself, but the reader also learns about her personality from the contributions of the other characters. Furthermore, all the characters are described by the ideas they have of themselves as well as the contributions of other characters. Although the main character of the book is Clarissa and she is fundamental for her own description, also the other characters contribute to describe her. Furthermore, each of the characters of the novel contributes to the description of other characters. Therefore *Mrs. Dalloway* is a book where the reader comes to know about particular characters through the perception that other characters have of them. Thus the idea of multiple points of view is at the core of the descriptions of the main character as well as the other characters.

In *Mrs Dalloway* the idea of spatial multiple points of view is completely developed. The story is about a day in the life of Clarissa Dalloway. It is not an ordinary day because that night she will give a party (a contribution for society as she intended). The story starts early in the morning and as the day goes by, the thoughts of the multiple characters invited to the party become part of the narrative, providing their own perspective regarding the life of other characters. The information provided by the thoughts of the characters is supported by events that happened in the past. With this kind of narration, the reader is able to learn about an individual character from the eyes of not just one person or narrator, but multiple observers describing his or her personality.

The scene in Regent's Park where Septimus, Lucrezia and Peter Walsh meet, is a fine example of the spatial multiple points of perception that can be found within *Mrs. Dalloway*. Septimus and Lucrezia arrive in the park after Septimus had a bad time while a limousine created chaos in the street where they were previously walking. The couple sit on a bench where Lucrezia tries to calm down Septimus, who suffers from a mental illness due to his experiences in World War I.

On the other hand, Peter Walsh, who was in love with Clarissa when young, had just arrived in London. After speaking with Clarissa, he goes to Regent's Park to reflect on his conversation with her. After these reflections he falls asleep on a bench and starts dreaming. Lucrezia, Septimus and Walsh are sitting on benches of the park at the same time narrating different events of their lives;

different points of view are revealed in the same spatial place.

When Peter Walsh wakes up from his dreams, and thinks about how he met Clarissa and fell in love with her, he sees how a small girl crashes into the leg of a lady. In this precise action different points of view of the same event can be seen, because when the little child crashes into Lucrezia's leg, the same scene is told by the narrator from the perspective of two different characters, Walsh and Lucrezia. The narrator first tells the reader how Walsh is living the moment:

> Still, he thought, yawning and beginning to take notice – Regent's Park had changed very little since he was a boy, except for the squirrels – still, presumably there were compensations – when little Elise Mitchell, who had been picking up pebbles to add to the pebble collection which she and her brother were making on the nursery mantelpiece, plumped her handful down on the nurse's knee and scudded off again full tilt into a lady's legs. Peter Walsh laughed out loud.[205]

So, from these words we can see that Peter Walsh is enjoying the moment and enjoying the park, which is bringing him memories of the past. The narrator is providing the reader the experiences of Peter Walsh. And then Lucrezia also perceives the same event, and the narrator explains how she lives this same moment.

> But Lucrezia Warren Smith was saying to herself, It's wicked; why should I suffer? She was asking, as she walked down the broad path. No; I can't stand it any longer, she was saying, having left Septimus, who wasn't Septimus any longer, to say hard, cruel, wicked things, to talk to himself, to talk to a dead man, on the seat over there; when the child ran full tilt into her, fell flat, and burst out crying.
>
> That was comforting rather. She stood her upright, dusted her frock, kissed her. [206]

What Woolf is achieving with this particular situation is a more realistic scene, because the reader does not only know the thoughts of Peter Walsh or Lucrezia, of their particular impressions about an event. But the reader is able to 'visualize' the same event from the perspective of Walsh who finds the moment 'funny' and from the perspective of Lucrezia who paid almost no attention to the event, because of being deep in thought about her husband and his problems due to World War I, and only thought that it was 'comforting'.

Furthermore, another event marks the different perspectives of the three characters. Lucrezia is going back to the bench where Septimus is having a crisis. Then while Lucrezia is trying to calm down Septimus (because he is watching a dead man), Peter just passes in front of them and wonders why were they fighting. Again the narrator provides the reader the two different perspectives from which the characters are living the same event. The narrator, describing the thoughts and actions of the three characters by changing the narration from what one character is thinking and acting to another one and then again to another one, is giving a more accurate, a more precise account of the events. The narration provides the reader with different versions on how the characters are living this moment from their particular position within the scene. The author's narration at the same time

---

[205] Woolf V. *Mrs Dalloway. op cit*. p. 71, note 204.
[206] Ibid.

is portraying the inner feelings of the characters describing their own thoughts and also, how they look from the outside while they are experiencing these feelings, describing them by the actions and thoughts of other characters. As happens in this scene, while Walsh is passing by Lucrezia and Septimus:

> And that is being young, Peter Walsh thought as he passed them. To be having an awful scene – the poor girl looked absolutely desperate – in the middle of the morning- But what was it about, he wondered; what had the young man in the overcoat been saying to her to make her look like that; what awful fix had they got themselves into, both to look so desperate as that on a fine summer morning?[207]

Here Peter describes Lucrezia as 'absolutely desperate', so the reader knows how Lucrezia looks from the outside, while before this she has described all the emotions that she is feeling and coping with. The question that Peter Walsh is asking can be easily answered by the reader, who has learned from the previous narration that Lucrezia and Septimus are having problems because Lucrezia cannot stand Septimus' behaviour any longer. But this Peter does not know, he is a spectator of the situation, he can only know what he is experiencing, his vision of events is that it is a 'fine summer morning', and he cannot understand why those two people are fighting. On the other hand, Lucrezia and Septimus do not know all the reader knows about Peter and his recent thoughts regarding his love for Clarissa. However, the reader knows both perspectives and he/she has a more comprehensive understanding of the situation that is taking place.

After this episode, Lucrezia, Septimus and Peter run into each other outside the park while Peter is stepping into a taxi and Lucrezia and Septimus are off to see Sir William Bradshaw. Woolf again narrates the same scene from the perspective of two characters. The three of them are watching and hearing a woman who is outside the park. In this scene Virginia Woolf uses the voice of the woman as a reference sound. The words of the song are mixed with the narration of events of both characters, Walsh and Lucrezia. First the actions and thoughts followed by Walsh are narrated and while the narration is taking place, some lines of the song are mixed in with Peter's thoughts. And then the actions and thoughts of Lucrezia are narrated again with some lines of the song as a reference indicating that the action is the same, only that it is being perceived by two different characters. Just as happened before with the little girl, the sound of the woman's voice becomes an action which is at the core of the events that the characters appreciate from several points of view, the narration of the same event from different characters gives the reader more than one interpretation of the perception of the actions that are being developed.

The party is the occasion where most of the characters except Septimus (because by this time he had already committed suicide) get reunited. In this last part of the book the phenomenon of a collective consciousness, where the actions and thoughts of the characters is narrated, takes place.

---

[207] Ibid. p. 77.

Each of the characters that become part of the dialogues provides some elements to understand how the party is developing. The idea of 'party consciousness' or 'frock consciousness' is an idea that was engaging Woolf in the period when she wrote *Mrs Dalloway*, especially just before its publication. *Mrs Dalloway* was published in May 1925 and one month before Woolf wrote:

> But my present reflection is that people have any number of states of consciousness: & I should like to investigate the party consciousness, the frock consciousness &c. The fashion world at the Becks—Mrs Garland was there superintending a display—is certainly one, where people secrete an envelope which connects them & protects them from others, like myself, who am outside the envelope, foreign bodies. These states are very difficult (obviously I grope for words) but I'm always coming back to it. The party consciousness, for example: Sybil's consciousness. You must not break it. It is something real. You must keep it up; conspire together. Still I cannot get at what I mean.[208]

These multiple states of consciousness Woolf is referring to is the phenomenon she portrays in Clarissa's party where not only the actions taking place among the several characters are narrated but also, the reader gets to learn about the inner thoughts and feelings of the characters. In the party Woolf opens the 'envelope' that she is speaking about in her diary and lets the reader understand the feelings and thoughts of the characters while they are at the party not only by what the omniscient narrator can relate. This party consciousness is also achieved by the narration of the actions and thoughts from the point of view of the characters. In this party, the spatial phenomenon of multiple points of view reaches its zenith with the description of the thoughts and actions that are taking place:

> Every time she [Clarissa] gave a party she had this feeling of being something not herself, and that every one was unreal in one way; much more real in another. It was, she thought, partly their clothes, partly being taken out of their ordinary ways, partly background; it was possible to say things you couldn't say anyhow else, things that needed an effort; possible to go much deeper. But not for her; not yet anyhow.
>
> "How delightful to see you!" she said. Dear old Sir Harry! He would know everyone.
>
> And what was so odd about it was the sense one had as they came up the stairs one after another, Mrs. Mount and Celia, Herbert Ainsty, Mrs. Dakers—oh. And Lady Burton!
>
> "How awfully good of you to come! She said, and she meant it—it was odd how standing there one felt them going on, going on, some quite old, some…
>
> *What* name? Lady Rosseter? But who on earth was Lady Rosseter?
>
> "Clarissa!" That voice! It was Sally Seton! Sally Seton! After all these years! She loomed through a mist. For she hadn't looked like *that*, Sally Seton, when Clarissa grasped the hot-water can. To think of her under this roof, under this roof! Not like that!
>
> All on top of each other, embarrassed, laughing, words tumbled out—passing through London; heard from Clara Haydon; what a chance of seeing you! So I thrust myself in—without an invitation…
>
> One might put down the hot-water can quite composedly. The lustre had left her. Yet it was extraordinary to see her again, older, happier, less lovely. They kissed each other, first this cheek, then that, by the drawing-room, and Clarissa turned, with Sally's hands, and saw her rooms full, heard the roar of voices,

---

[208] Woolf Virginia. *The Diary of Virginia Woolf. Volume Three 1925-1930*. Edited by Anne Olivier Belle. The Hogarth Press, London 1980. p. 12-13.

saw the candlesticks, the blowing curtains, and the roses which Richard had given her.[209]

In the first paragraph of this part of the book it is the narrator who is describing how Clarissa felt, yet the next line is a combination of what Clarissa is saying 'How delightful to see you!' the narrator's voice 'she said', what Clarissa says 'Dear old Sir Harry!', and finally what Clarissa thinks about Sir Harry 'He would know everyone'. Apart from the sentence 'She said, and she meant it', in the next three paragraphs Clarissa is the one who is thinking about her condition of host and speaking with the guests who are just arriving, watching how everybody is coming to say hello.

The next sentence it is Clarissa who narrates how she hears the voice of Sally Seton until 'After all these years!'. Then the narrator continues the narration until 'the hot-water can'; Clarissa's thoughts finish the paragraph. The next paragraph is again a combination of the narration of the omniscient narrator and the voices of the multiple characters on the stairs, and the last sentence 'without an invitation' is a thought of one of the multiple characters. The next paragraph it is the narrator who portrays the moment in which Clarissa and Sally say hello. This last paragraph reminds us how the entire party is starting and gives the reader a clear image of how everybody is speaking and, as we have seen, thinking, because the narration of this part of the book continues to develop in the same way, only with the perception that other characters of the book have of the situation. The last part of the book where the actions of Clarissa's party is narrated, is a constant change of the perceptions of the people who were invited to the party and with the help of the narrator, an entire perception of how the party developed can be seen by the reader. Therefore the reader has more than one perspective; he/she understands the events of the party by a multiplicity of perceptions from different points of view.

By the beginning of the year 1925 Woolf was starting to conceive her next novel, but it was not until May 1927 that *To the Lighthouse* was published. This novel is the next example where the multiple points of view strategy is used to narrate particular scenes such as when some of the characters are all reunited and have dinner together.

In this case, what Virginia Woolf does is to narrate a scene where some of the characters are sitting at a table. Here the narrator and each of the personages contribute in thoughts as well as actions to the reader's understanding. The characters are speaking to each other but also thinking. By occupying the indirect discourse narrative technique, Woolf is describing more than what is being said between the characters. She called this phenomenon party consciousness:

> That the fishing season was bad; that the men were emigrating. They were talking about wages and unemployment. The young man was abusing the government. William Bankes, thinking what a relief it

---

[209] Wool V. *Mrs Dalloway. op cit*. pp. 187-188, note 204.

was to catch on to something of this sort when private life was disagreeable, heard him say something about 'one of the most scandalous acts of the present government'. Lily was listening; Mrs Ramsay was listening; they were all listening. But already bored, Lily felt that something was lacking; Mr Bankes felt that something was lacking. Pulling her shawl round her, Mrs Ramsay felt that something was lacking. All of them bending themselves to listen thought, 'Pray heaven that the inside of my mind may not be exposed,' for each thought, 'The others are feeling this. They are outraged and indignant with the government about the fishermen. Whereas, I feel nothing at all.' But perhaps, thought Mr Bankes, as he looked at Mr Tansley, here is the man. One was always waiting for the man. There was always a chance. At any moment the leader might arise; the man of genius, in politics as in anything else. Probably he will be extremely disagreeable to us old fogies, thought Mr Bankes, doing his best to make allowances, for he knew by some curious physical sensation, as of nerves erect in his spine, that he was jealous, for himself partly, partly more probably for his work, for his point of view, for his science; and therefore he was not entirely open-minded or altogether fair, for Mr Tansley seemed to be saying, You have wasted your lives. You are all of you wrong. Poor old fogies, you're hopelessly behind the times. He seemed to be rather cocksure, this young man; and his manners were bad. But Mr Bankes bade himself observe, he had courage; he had ability; he was extremely well up in the facts. Probably, Mr Bankes thought, as Tansley abused the government, there is a good deal in what he says.

'Tell me now…' he said. So they argued about politics, and Lily looked at the leaf on the table-cloth; and Mrs Ramsay, leaving the argument entirely in the hands of the two men, wondered why she was so bored by this talk, and wished, looking at her husband at the other end of the table, that he would say something.[210]

The conversation continues, but these paragraphs are enough to show how Virginia Woolf was creating a narrative where the thoughts and actions of each character were participants in the story. From the very first lines of the paragraph multiple narrative techniques are in place. In the first two lines it is the omniscient narrator who is explaining the actions. Then in the second line it is still the narrator who is talking, although after the word 'thinking' he/she is exposing the thoughts of William Bankes. In the fourth line the narrator returns to describe the scene, until in the sixth, Mrs Ramsay's thoughts interrupt the narrator to start a short interior monologue which ends when she says 'I feel nothing at all'. The narrator comes back to speak from Mr Bankes' point of view, so from line eight to line thirteen the reader knows about Mr Bankes' thoughts through what the narrator is saying about him. The narrator keeps going but now is showing the reader the thoughts of Mr Tansley, until in line fifteen the narrator gets back to the thoughts of Bankes, whose thoughts are the last to be exposed in this fragment. In this paragraph the scene is narrated from four different points of view. The scene where the characters surround the table is in a constant changing of perspective, from the narrator to Bankes to the narrator to Mrs Ramsay, to Bankes to Mrs Tansley and finally to Bankes again.

Furthermore, this novel is where for the first time Woolf makes explicit reference to her interest in the perception of a scene from multiple points of view. Lily Briscoe is asking for: 'One wanted fifty pairs of eyes to see with, she reflected. Fifty pairs of eyes were not enough to get round that

---

[210] Woolf, Virginia. *To the Lighthouse.* Oxford University Press. 2008. p. 77.

one woman with, she thought.'*[211]*

Woolf is concerned with the different perspectives needed to know a personality, with the different angles that a person reflects to the others. And it is through the party consciousness that she embraces a more accurate representation of what is happening when more than one human being is having a conversation with others.

The Waves is the last work that needs to be mentioned to understand the meaning and use that Woolf attached to the concept of multiple points of view. The year of its publication was 1931, although Virginia had been imagining the story since June 1929, when she first referred to how the book should begin.

The story of the book starts with monologues of the six main characters early in the morning. The entire story is based on these monologues; all of them are narrated in a certain period of time from the childhood of the characters until their maturity. The narrative is not told by an omniscient narrator, it is based on the monologues of these friends and the intersection of their thoughts while they speak between themselves.

The reader becomes familiar with the characters via the different perceptions provided by the monologues of the characters and also through the different points of view and experiences that the characters have referring to other characters. For example, through the characters' perceptions the reader knows about the seventh character Percival and about his death. All the characters either by their monologues or by the interaction among them, speak about how Percival was, which were his physical but also emotional characteristics as a human being.

In *The Waves* it becomes clear that Woolf wanted to show that to know a character, it could not be done only through his/her own image. It is also necessary that the image of a character is presented from an outside observer, for example other characters of the same story. He or she cannot be known entirely through him or herself; within the book one of the characters, Bernard, in a monologue makes this affirmation:

> I need eyes on me to draw out these frills and furbelows. To be myself (I note) I need the illumination of other people's eyes, and therefore cannot be entirely sure what is myself. The authentics, like Louis, like Rhoda, exist most complete in solitude.[212]

With this book Woolf arrived at the most sophisticated narrative in her use of the idea of multiple points of view. And as can be seen, the 1920s was the most prominent decade for the development of this idea in the sense that there are several short stories and novels that have to do with the concept of multiple points of view, and its development within the narrative was one of the main aims Woof wished to achieve in this decade. With *Mrs Dalloway* and *The Waves*, Virginia

---

[211] Woolf, V. *To the Lighthouse. op. cit*. p. 161, note 210.
[212] Woolf, Virginia. *The Waves*. Penguin Modern Classics. p. 87.

Woolf clearly showed how the narrative could use the concept of multiple points of view for the development of a story where the reader would be able not only to gain a unique image of a person, a place or even an object. With this narrative the reader would be enabled to gain a more accurate idea of the various actions that were taking place in the scenes of the story.

2.2. *Simultaneity*

In Woolf's narrative the idea of simultaneity is also present. In the 1920s she wrote three major novels where the concept of simultaneity is reflected. *Mrs Dalloway*, *To the Lighthouse* and *The Waves* are all concerned with representing the simultaneity of time. Chronologically *Mrs Dalloway* is the first experiment dealing with simultaneous stories within the day when the story occurred.

Indeed *Mrs Dalloway* is a book where the idea of simultaneity is of primary importance for the development of the narrative. The characters of the story are constantly encountering each other, as with our previously cited scene of Lucrezia, Septimus and Peter Walsh, in the park without noticing each other while developing at the same time different activities. Or as happens by the end of the book where all the characters are reunited at Clarissa's party and the reader gets to learn about the actions that are being developed through various characters in several locations in the house.

In *Mrs Dalloway* the first time we find simultaneous events is in section two of the book, when a limousine is parking in front of Buckingham Palace and a crowd of people is approaching it. In that precise moment an airplane passes overhead and meanwhile Clarissa is watching the event from not so far away, and two other characters Lucrezia and Septimus, who minutes ago left the crowd near the palace, are now watching the same airplane sitting on a bench from a park one kilometre away.

The next example of simultaneity is manifested when Clarissa goes home and starts thinking about her unfortunate marriage and about Peter Walsh, while she continues the arrangements for the party (she was mending her party dress) until Peter visits her. After speaking with her Peter leaves Clarissa's house exactly at 11:30 a.m. and then goes to the park. Peter passes through Trafalgar Square and then he stops at Regent's Park. There he falls asleep for just some minutes and when he wakes up, he starts walking and passes by Lucrezia and Septimus. These last 45 minutes, after watching the limousine arriving at the palace, Lucrezia spent trying to calm down Septimus at the park. Clarissa's arriving home, meeting with Peter, Peter's walk to the park and short nap, occurred in the interval of time that Lucrezia and Septimus were in the park.

Woolf's intention to tell a story where the events happen to the different characters simultaneously in time and space, is noticeable in the scene when at the entrance to the park, the thoughts and actions that are developing involving Lucrezia and Walsh are narrated. Peter Walsh is just leaving the park and he is planning to take a taxi while he hears a song, which is being sung by

an old woman outside the tube.

> A sound interrupted him; a frail quivering sound, a voice bubbling up without direction, vigour, beginning or end, running weakly and shrilly and with an absence of all human meaning into
>
> ee um fah um so
>
> foo swee too eem oo –[213]

This part of the song is written again only few lines later, and then the narrator explains some of the woman's feelings. The narration continues by describing how when Walsh is just about to take his taxi, the voice of the woman is singing:

> 'give me your hand and then let me press it gently' (Peter Walsh couldn't help giving the poor creature a coin as he stepped into his taxi), 'and if some one should see, what matter they?'[214]

In the next lines of the narrative again the same 'ee um fah um so foo swee too eem oo—' is repeated. But this time the song does not continue, the woman does not repeat the same part of the song. Instead, the narration is now focused on what Lucrezia is feeling exactly at the same time as when Walsh started to hear the voice. The reader will notice this because among the next lines the words 'And if someone should see, what matter they?' are again repeated. What Virginia Woolf did was to use the song as a reference point from which the actions and the thoughts of different characters could be narrated at the same precise moment. Woolf used the voice of the woman to, in a sense, build a background to the actions that were being carried out by the characters.

The characters continue on their way and while Clarissa is laying her dress on the bed, Big Ben announces noon. Septimus and Lucrezia hear the clock while walking to the doctor's. They spend an hour and a half with the doctor and when they come out, they encounter Hugh Whitbread, who is going to have lunch with Richard Dalloway at Lady Bruton's. In this precise moment, in another spatial context, Clarissa is writing at her room table where Richard found her after lunch.

It is 3:30 in the afternoon and Big Ben sounds again; Clarissa is at home with her daughter Elizabeth and Miss Kilman (Elizabeth's history tutor). At this moment they split, Clarissa is left on her own and the narration of her thoughts follows her, whereas Elizabeth and Miss Kilman go on a walk. At exactly the same time, however, in another spatial location Septimus is committing suicide. After the suicide, while the ambulance is going to the hospital, Peter Walsh is walking to his hotel to get ready for Clarissa's party.

The sound of Big Ben becomes important for both the characters and the plot. In the various activities of the characters in the on-going story, the sound of Big Ben pervades or punctuates the atmosphere where the actions are taking place. Apart from Woolf's concern to show the measuring of time in *Mrs Dalloway*, the sound of Big Ben becomes a spatial connector of the various activities

---

[213] Woolf V. *Mrs Dalloway*. *op cit*. p. 88, note 204.
[214] Ibid. p. 90.

of the characters. This phenomenon gives the reader the chance to understand the idea of simultaneous events. Due to this inclusion of Big Ben's sounds as a time reference, the reader is able to learn how the various stories of the characters developed. The reader can contrast the different stories and learn precisely the location of the characters and the actions being carried out at any precise moment. This is how we know that exactly at eleven o'clock in the morning while Clarissa is at the gates of Buckingham Palace, Lucrezia and Septimus are sitting on a bench in Regent's park.

In *Mrs Dalloway*, just an instant before the sound of Big Ben, another event also assumes the same function as the sound of Big Ben: the airplane passing overhead. This airplane is a visual as well as an aural event, denoting the simultaneity of the actions taking place in the center of London.

As we have already mentioned, almost all the characters attend the party, where a simultaneous interaction among the characters takes place. Woolf reunites all the characters of her novel after a day of following their specific individual paths, constantly drawing the reader's attention to what is happening to all the main characters at the same precise moment.

In *To the Lighthouse* two fine examples of simultaneity deserve analysis. The first is the already mentioned scene when the characters are sitting at the table, where Woolf presents a simultaneous interaction of their thoughts and words. While William Bankes is speaking about politics, the other characters are immersed in their own thoughts, Woolf focusing on Lily's thoughts; from the words going through her head it emerges that she does not want to hear the conversation, and we realize how bored she is.

The other example refers to the different paths the main characters followed in the last part of the book. The Ramsays have come back to their summer home ten years later. This time Mr Ramsay is persuaded to take both children, James and Camilla, to the lighthouse, an event that never came about the last time they were there.

On this occasion it almost fails to happen due to the delays and the children's lack of enthusiasm. They are not going alone however; the Ramsays go with the sailor Macalister and his son. Meanwhile, Lily Briscoe stays at home to finish the painting that the last time she was there she could not finish, - Mrs Ramsay's portrait.

At this moment, Lily Briscoe starts thinking about some events of the past. She thanks Mrs Ramsay for encouraging her to continue painting although at the same time she thinks of how Mrs Ramsay controlled many aspects of her life, and that she did not like it. So Lily, while painting in the present, is also thinking of past memories; both activities are captured at the same time. While she is finishing the painting she realizes how pleased she is with the painted canvas.

Exactly at the time of the Ramsays' departure, a simultaneous narration begins. The two actions

occur at the same time and what Virginia Woolf did to narrate both stories was to divide the last section of the book into subsections. The first two subsections narrate the time of the departure whereas in the third, the reader is presented with Lily's feelings about Mrs Ramsay. From here until the end of the book, in each subsection what is happening in the two different spatial places will be related, the summer home and the journey to the lighthouse. Subsection six goes like this: [MACALISTER'S boy took one of the fish and cut a square out of its side to bait his hook with. The mutilated body (it was alive still) was thrown back into the sea.][215], and subsection nine goes like this:

> [The sea without a stain on it, thought Lily Briscoe, still standing and looking out over the bay. The sea is stretched like silk across the bay. Distance had an extraordinary power; they had been swallowed up in it, she felt, they were gone for ever, they had become part of the nature of things. It was so calm; it was so quiet. The steamer itself had vanished, but the great scroll of smoke still hung in the air and dropped like a flag mournfully in valediction.][216]

Woolf makes these sections very short, as if she wanted to stress that the events were happening simultaneously. The short subsections were part of a technique that Woolf used to describe, with brief glimpses, what is happening in one spatial context. Then she returns to the other spatial context.

The concept of simultaneity was also used in *The Waves*. One of the first examples is when at a certain moment some of the main characters are reunited. Here the narrative describes the thoughts of the multiple characters that are taking part in the scene, and through these thoughts the reader is able to learn about the action that is taking place. Susan said:

> 'At home the hay waves over the meadows. My father leans upon the stile, smoking. In the house one door bangs and then another, as the summer air puffs along the empty passages. Some old picture perhaps swings on the wall. A petal drops from the rose in the jar. The farm wagons strew the hedges with tufts of hay. All this I see, I always see, as I pass the looking-glass on the landing, with Jinny in front and Rhoda lagging behind. Jinny dances. Jinny always dances in the hall on the ugly, the encaustic tiles; she turns cartwheels in the playground; she picks some flower forbiddenly, and sticks it behind her ear so that Miss Perry's dark eyes smouldered with admiration, for Jinny, not me.'[217]

And then Jinny said:

> 'I hate the small looking-glass on the stairs,' said Jinny. 'It shows our heads only; it cuts off our heads. And my lips are too wide, and my eyes are too close together; I show my gums too much when I laugh. Susan's head, with its fell look, with its grass-green eyes which poets will love, Bernard said, because they fall upon close white stitching, put mine out; even Rhoda's face, mooning, vacant, is completed, like those white petals she used to swim in her bowl. So I skip up the stairs past them, to the next landing, where the long glass hangs and my head. Look, when I move my head I ripple all down my narrow body; even my thin legs ripple like a stalk in the wind. I flicker between the set face of Susan and Rhoda's vagueness; I leap like one of those flames that run between the cracks of the earth; I move, I dance, I

---

[215] Woolf V. *To the Lighthouse*. o*p. cit.* p.148, note 210.
[216] Ibid. p. 154.
[217] Woolf V. *The Waves*. *op cit.* p. 29. note 212.

never cease to move and to dance.[218]

And then Rhoda said:

'That is my face,' said Rhoda, 'in the looking-glass behind Susan's shoulder – that face is my face. But I will duck behind her to hide it, for I am not here. I have no face. Other people have faces; Susan and Jinny have faces; they are here. Their world is the real world. The things they lift are heavy. They say Yes, the say No; whereas I shift and change and am seen through in a second. If they meet a housemaid she looks at them without laughing. But she laughs at me. They know what to say if spoken to. They laugh really; they get angry really; while I have to look first and do what other people do when they have done it.[219]

From page 29 to page 32, Susan, Jinny and Rhoda will be part of the narrative and the thoughts and actions will be simultaneously shown; the same time is occurring when the words 'I hate the small looking-glass on the stairs' are used to start the account of each of the characters about the actions and about the others' characters.

In his book *Einstein's Wake*, Michael Whitworth outlines a characteristic of how Virginia Woolf used the concept of simultaneity in some of her novels. He particularly places emphasis on *Mrs. Dalloway* and *The Waves*:

The simultaneity of *The Waves* is heterotopic: like a telephone call, it brings two or more diverse places together in one. The simultaneity of *Mrs Dalloway* and other works of high modernism is heterochronic: it brings together two or more diverse times as if they were simultaneous.[220]

The quality of heterotopic that Whitworth is assigning to the concept of simultaneity in *The Waves*, as has been seen, is also a phenomenon repeated in *Mrs Dalloway*—where Big Ben and the airplane are two objects that allow the reader to understand that different situations are happening simultaneously in two different spatial places—and in *To the Lighthouse*, where the trip of the Ramsays and Lily's painting moment happen simultaneously.

This feature of the concept of simultaneity will be crucial to the last section of this chapter because, in Woolf's narrative, we have a structure that contemplates together the concepts of simultaneity and multiple points of view. In the last section of this chapter this organization will be shown.

2.3. *Maps*

The article 'Literary Geography' written by Woolf and published in 1905 by the *Times Literary Supplement* would mark the beginning of Woolf's engagement with the concept of geography and maps. She reviewed two books, *The Thackeray Country* by Lewis Melville and *The Dickens Country* by F.G Keaton. Woolf was first of all against the definition implied by both authors in their titles because she thinks that the novelists not only 'own a country' but 'that all who dwell in it are

---

[218] Ibid. pp. 29-30.
[219] Ibid. pp. 30-31.
[220] Whitworth M. *op cit*. p. 185-186, note 199.

their subjects. It seems a little incongruous to talk of the Thackeray "country" or the Dickens "country" in this sense…'[221] Apart from the criticisms Woolf is making about Melville and Keaton's definitions, Woolf is deeply interested in the accuracy that the narration of events can give to the reader regarding a particular city. In the case of Thackeray, Woolf considers that his descriptions of London are not well achieved: 'And even in London, the scene of "Vanity Fair," of "Pendennis," of "The Newcomes," it is not easy to decide upon the exact shrine at which we are to offer incense. Thackeray did not consider the feelings of these devout worshippers and left many of his localities vague.'[222] Concerning Dickens, Woolf's opinion about his narrative and the way he describes the streets of London is a better one: 'No one probably has ever known his London so intimately as Dickens did, or has painted the life of the street with such first-hand knowledge.'[223] However, in her concluding lines, Woolf writes:

> A writer's country is a territory within his own brain; and we run the risk of disillusionment if we try to turn such phantom cities into tangible brick and mortar. We know our way there without signposts or policemen, and we can greet the passers by without need of introduction. No city indeed is so real as this that we make for ourselves and people to our liking; and to insist that it has any counterpart in the cities of the earth is to rob it off half its charm.[224]

As can be seen, the city constructed in the brain of a writer should not be compared with a real city—in this period Woolf's vision was less inclined to reproduce the images of the places where her imaginary characters used to live—, otherwise the reader would in the end suffer a 'disillusionment'. However, Woolf's argument refers to the lack of accuracy that the narrative, while describing cities, may be engaged with. As will be seen later on, in the subsequent years the rapport between Woolf and geography will radically change. Her intentions concerning narrative and the mapping of a city will be focused on being as accurate as possible, so the image of an 'imaginary' city constructed by her narrative when confronted with a 'real' city, would not cause any disillusion.

Apart from this first attempt to characterize geography within the narrative, it is not until the 1920s that her engagement is reflected in her major novels. Throughout *Jacob's Room*, the idea of mapping a city by naming the streets and places in detail and with accuracy is constantly present. In fact, the book reads rather like a map of mid-twenties London. A map might be added to the latest edition of the book for a better understanding of what the London described by Woolf looked like. More intriguing would be to learn whether the Hogarth Press, which was owned by her and her husband, had intended to publish a map. If this is the case, it would mean that right from the outset

---

[221] Woolf Virginia. 'Literary Geography'. Times Literary Supplement. 1905.
[222] Woolf V. Literary Geography. *op cit*. note 221.
[223] Ibid.
[224] Ibid.

Woolf already had the idea of comparing a geographical map with the map she was constructing through her own words, a narrative map.

In this book Woolf compares the search for a place within a map with the metaphorical role that the reader acquires of being a searcher, while he/she is trying to find out the necessary information to make sense of the characters. In a sense in *Jacob's Room* the reader tries to find out what Jacob looks like and what are his characteristics as a human being, starting only from what other characters think about him. In the next passage, the narrator describes actions taking place in a specific area of London:

> The omnibus stopped outside Charing Cross; and behind it were clogged omnibuses, vans, motor-cars, for a procession with banners was passing down Whitehall, and elderly people were stiffly descending from between the paws of the slippery lions, where they had been testifying to their faith, singing lustily, raising their eyes from their music to look into the sky, and still their eyes were on the sky as they marched behind the gold letters of their creed.

> The traffic stopped, and the sun, no longer sprayed out by the breeze, became almost too hot. But the procession passed; the banners glittered far away down Whitehall; the traffic was released; lurched on; spun to a smooth continuous uproar, swerving round the curve of Cockspur Street; and sweeping past Government offices and equestrian statues down Whitehall to the prickly spires, the tethered grey fleet of masonry, and the large white clock of Westminster.[225]

The narration of the scene continues with the same accurate description of the places, and in *Jacob's Room* these descriptions can continually be found. In the entire book there is no precise sequence of actions related by just one character. Instead what the reader finds is a portrayal of the space, of the city and the places within the city, constructed by the descriptions of the narrator. Furthermore, the images provided by Woolf begin to reflect a concern to show more than the spatial places, to show a more realistic image of the situation, of the actions that are taking place. The mapping helps the reader gain a more clearly defined idea of how the events within the narrative developed. Woolf will start to describe sounds and smells for a more accurate perception of what is happening. This accuracy in the spatial descriptions will be used not only in *Jacob's Room* but also her subsequent novels *Mrs Dalloway* and *The Waves*.

In *Mrs. Dalloway* there is scrupulously accurate mapping of the streets and places in the centre of London. In fact, at the beginning of the book there is a map of London. From the beginning of the novel Woolf perfectly describes the locations where the actions are happening without forgetting to name the streets and the places to provide the reader with a vivid impression about them:

> Bond Street fascinated her; Bond Street early in the morning in the season; its flags flying; its shops; no splash; no glitter; one roll of tweed in the shop where her father had bought his suits for fifty years; a few

---

[225] Woolf V. *Jacob's Room. op cit.* p. 150-151, note 203.

pearls; salmon on an iceblock.[226]

Virginia Woolf not only reproduced the places and streets, she also provides us with smells and flavours, which are significant for the readers' imagination. Victoria Street, Piccadilly Street, Arlington Street, St. James Park, Buckingham Palace, Trafalgar Square, Regent's Park, etc., are all among the places described by Woolf.

Clarissa and Peter Walsh are two of the main characters that walk the city streets and, while they are walking, they describe the streets and the places they are passing through. From Woolf's narrative it is possible to reproduce in a map the path Clarissa followed early on in the book to reach the flower shop. In *Mrs Dalloway* Woolf maps the streets of London basing this on her narrative, as if she intended to use the map at the beginning of the book as a challenge for her own descriptive abilities, using narrative as a medium to achieve this description. Her words constantly address our imagination in a geographical sense.

> If Joyce was said to have written *Ulysses* with an open map of Dublin alongside him, it appears that Woolf also saw the potential of maps for the writing of fiction. Some of her reading notes on *The Canterbury Tales* from 1922 contain an outline map of Green Park, Stratton Street and Bond Street in preparation for Clarissa's early morning jaunt in the novel.[227]

If readers do not know London, they have to make the effort to try to situate themselves in the centre of an undefined city and from there, following Woolf's text which is able to reproduce the images that the characters of the book are seeing, conceive of London. The space that Virginia is narrating does not only describe geographical places. It provides not only accuracy in the streets and in their disposition, but she also describes the sounds, the smells and the activities that are being developed at a specific place and time of the day. So what Virginia Woolf is describing is not a map as a geographical space, but a map that is considering a specific time of the day, where actions are taking place. For example, it is not the same to see London by day or by night, in the morning or in the afternoon. What Woolf is portraying is not only the space but by narrating the activities that are taking place in a certain hour of the day, she is illustrating a more accurate map of London. Due to the actions followed by the characters, the smells, the sounds and even the flavours, the spatial surroundings can be recognised with more accuracy. And immersed in these images is where the reader will find the characters:

> But, how strange, on entering the Park, the silence; the mist; the hum; the slow-swimming happy ducks; the pouched birds waddling; and who should be coming along with his back against the Government building, most appropriately, carrying a despatch box stamped with the Royal Arms, who but Hugh Whitbread; her old friend Hugh—the admirable Hugh![228]

---

[226] Woolf V. *Mrs Dalloway. op cit.* p. 11, note 204.

[227] Thacker, Andrew. *Moving through Modernity: Space and Geography in Modernism.* Manchester University Press. 2003. p. 154.

[228] Woolf V. *Mrs Dalloway. op. cit.* p. 5, note 204.

For her next novel, Virginia will stop working on the recreation of geographical spaces and will consider the concept of space from another direction, the art of painting. But she will return to the description of geographical space in her later novel *The Waves*, where she will continue to set out her ideas in relation to maps, narrative and description.

In *To the Lighthouse*, Woolf will embrace the concept of space, following some of the implications that arise when the concept is thought about in another environment. For example, what *happens* with the space of a canvas while it is being filled, how does a canvas come to be an accomplished painting?

Lily Briscoe, a young painter at the beginning of the book and one of its principal characters, as has already been mentioned, is painting a picture of Mrs. Ramsay and her son James, involved in the representation of reality.

In the painting of Lily Briscoe, the space of the canvas is filled by the past memories that the character is recalling while she is painting. She is relating all her feelings to the nature of space, trying to figure out how the emptiness may be filled. Woolf presents the reader with the relation of the empty space on a canvas and of the empty space of a book that is not yet written.

The idea of fulfilling the space is a metaphor employed by Woolf, she compares the canvas with the book before it is written. In this comparison, the description of the characters and the places where the actions are developed are equivalent to how realistic the picture of a person and of a place can be painted. This idea will be thoroughly explored in her next book, *The Waves*.

Woolf started writing *The Waves* early in 1929 and by the autumn of that year the first draft was achieved. It was not until the beginning of 1931 that a second draft was ready. While writing *The Waves* Virginia Woolf emphasised her aim to describe as accurately as possible each moment, each scene. In this book one of her main concerns was to fill as far as possible (just as on a canvas) the space where the actions take place. This means she was seeking to portray the characters of her novel and their surroundings while the actions were developed as accurately as possible.

> The idea has come to me that what I want now to do is to saturate every atom. I mean to eliminate all waste, deadness, superfluity: to give the moment whole; whatever it includes[229]

This was Woolf on 28 November 1928, almost two years after finishing *To the Lighthouse*. She had come back to the discourse on space and more specifically she had embraced once again the concept of mapping.

In fact, throughout *The Waves* there is constantly recurring mention of maps in the description of specific scenes. She also returns to the descriptions of modern London. The sounds, the colours, the

---

[229] Woolf Virginia. *The Diary of Virginia Woolf.* Volume 3 1925-1930. Edited by Anne Olivier Bell. The Hogarth Press. London, 1980. p.209.

places and the streets will once again be central to her discourse and they will be of primary importance for the development of the story. She will intensify her interest in describing an atmosphere full of sounds, more than any other feature.

'The roar of London,' said Louis, 'is round us. Motorcars, vans, omnibuses pass and re-pass continuously. All are merged in one turning wheel of single sound. All separate sounds – wheels, bells, the cries of drunkards, of merry-makers – are churned into one sound, steel blue, circular. Then a siren hoots. At that shores slip away, chimneys flatten themselves, the ship makes for the open sea. '[230]

These descriptions are once again aiming to map the city of London through the narrative by using not only the description of roads and geographical places, but also the sounds as elements providing further accurate description of the space. In this respect, the re-conceptualisation of space she achieves is deeply linked to mapping the space with more than a single source of explanation, just as happened in *Ulysses* of James Joyce and the city of Dublin. They both create the maps of a city supported by their narration of events, which include geographical places, sounds, colours and smells.

So far we have only described the ideas of multiple points of view, simultaneity and mapping in Virginia Woolf's novels and short stories from the 1920s. As can be seen, throughout this time she was deeply involved in the concepts of multiple points of view and mapping, both reflected in most of her works at this time. However, the concept of simultaneity was mainly reflected only in *Mrs Dalloway*, *To the Lighthouse*, and *The Waves*.

The next three sections will deal with Woolf's context and the interactions she had with the culture of her time in the areas of philosophy, art, science and technology. By outlining some contemporary thinkers' most important ideas in these areas, it will be seen how this interaction redirects the work she was developing by this decade.

2.4. *Woolf, Russell, and Fry: Multiple points of view*

To understand how Virginia Woolf arrived at the concept of multiple points of view within her narrative as a fundamental structure of perception, we need to consider the intellectual relationship she had with the ideas of the philosopher Bertrand Russell, and the support she received from her friend and artist Roger Fry.

In the years before the war, Russell had developed his theory of knowledge. Between the years 1912 and 1914 he was engaged in what later became *Our Knowledge of the External World as a Field for Scientific Method in Philosophy*. Two figures fundamental to the development of the book were Alfred North Whitehead, co-author of his previous book *Principia Mathematica*[231], and his

---

[230] Woolf V. *The Waves. op cit.* p. 101, note 212.
[231] Russell, Bertrand. *Principia Mathematica*. Cambridge University Press. The entire book was published in three

friend G.E. Moore. All three of them were at Cambridge in those years and were to a certain extent involved in the so-called Bloomsbury group. The philosophy of the group was mainly grounded in the ideas of these three, plus the contributions of Leonard Woolf.

One of the opportunities for the wider dissemination of Russell's ideas, into a broader intellectual environment than the philosophical and the scientific, was unexpectedly provided by art. As Ann Banfield has mentioned[232], this dissemination of ideas occurred as a consequence of the interaction that took place between different fields of knowledge within the Bloomsbury group, where Russell's theory of knowledge found itself reconsidered from an artistic perspective. Virginia Woolf came to see philosophy as a mixture of what can be described by the senses, a knowledge of the external world, and also of what scientific knowledge could provide. As will be seen below, modern physics was the main area of science Woolf will become familiar with.

Virginia did not have a formal higher education in any particular subject, women then being severely restricted in the development of their potential:

> I've just been taking a course of cookery lessons, at an institution in Victoria St.

> I do hope you're going to have Rachel taught plain cooking and needlework, as well as Icelandic and Portuguese. It is dreadful how we were neglected, and yet its not hard to be practical, up to a point, and such and advantage, I hope.[233]

She never went to university, a matter which by the way recurrently bothered her, and her approach to philosophy could not be direct because she never read Russell's books. One of the most important links between Russell and Woolf was the artist Roger Fry. His post-impressionist art provided Woolf with a means to understand and to link Russell's theory of knowledge with her own interests. She wished to provide her 'modern fiction' with a theoretical basis. Fry was so helpful to Woolf because she lacked education in the fields of mathematics, philosophy and logic, and he was able to interpret what the Cambridge philosophers were saying and transpose it into his art. To some extent, Fry enabled Woolf to understand recent developments in other fields of knowledge.

Woolf was aware of her disadvantages compared to people who had a university education. She blamed the fact of being a woman for her lack of education in fields such as science, mathematics and philosophy.

> Now if she had gone into business; had become a manufacturer of artificial silk or a magnate on the Stock Exchange; if she had left two or three hundred thousand pounds to Fernham, we could have been sitting at our ease to-night and the subject of our talk might have been archaeology, botany, anthropology, physics, the nature of the atom, mathematics, astronomy, relativity, geography. If only Mrs Seton and her mother and her mother before her had learnt the great art of making money and had left their money, like their fathers and their grandfathers before them, to found fellowships and lectureships and prizes and

---

parts in 1910, 1912 and 1913.
[232] Banfield, Ann. *op cit*. note 194.
[233] Woolf Virginia. *The Letters of Virginia Woolf*. Volume 2, 1912-1922. Edited by Nigel Nicolson. The Hogarth Press, London 1976. p. 56.

scholarships appropriated to the use of their own sex…[234]

However, this does not mean that she could not obtain current philosophical ideas from debates originating in her own social circle. The climate she grew up in and the atmosphere of philosophy that surrounded her, were to some extent participants in the discussions set out within her short fictions and novels.

From her notes and diaries it is undeniable that Woolf attended several lectures on philosophical issues of the time such as Russell's, 'There can be no doubt of it. She sat 2 seats from L. at the [Bertrand Russell] lecture, and fills him with such physical repulsion that he can hardly endure to look at her. He says the lecture was interesting, though hard to follow'[235]. Furthermore, there is available information where it can be seen how Russell and Moore were frequently in meetings where Woolf was also present; she also knew Whitehead and Keynes to some extent.

Moore was very important to the Bloomsbury group 'We discussed the moral eminence of Moore, comparable to that of Christ or Socrates…'[236] and even if Bertrand Russell has never been called a 'Bloomsbury' member, he was also very important as a philosophical figure for Woolf and for her intellectual circle, though she sometimes preferred to avoid his lectures.

> Yesterday, Tuesday, we both renewed London life in the usual way; save that I had to buy stuff for dresses, as well as paper labels & glue. Tea at the Club, where Alix, dusky & dreary, borrowed 10/- in order to give James his dinner. They were going to hear Bertie Lecture; I preferred the songsters of Trafalgar Square.[237]

There is no way to answer the question of whether human beings are capable of "knowing" the external world. Russell's theory of knowledge, however, questions the capacity of the human being to obtain knowledge from the external world, beyond what direct experience can provide. This is Russell's objection to knowledge, and is one of the dilemmas he analysed in his book.

Furthermore, due to the ability the mind has to 'create' objects from elements which are observable in the world but that actually do not exist in the world, Russell calls these new objects unobserved objects, which are fundamental to the claim that knowledge is not equal to perception. Thus, if an observer disappears it should not be said that knowledge, or better its possibility of existence, also has to be disclaimed. According to Banfield this specific component of Russell's theory of knowledge is reflected in Woolf's narrative, particularly in the character of Mr. Ramsay in *To the Lighthouse*:

---

[234] Woolf Virginia. *A Room of One's Own*. Oxford University Press. 1992. p. 27.

[235] Woolf Virginia. *The Letters of Virginia Woolf*. Volume 2 1012-1922. Edited by Nigel Nicolson. The Hogarth Press. 1976. p. 76.

[236] Woolf Virginia. The Diary of Virginia Woolf. Volume 1. 1915-1919. Edited by Anne Olivier Bell. The Hogarth Press, London 1977. p.155.

[237] Woolf Virginia. *The Diary of Virginia Woolf*. Volume 1. 1915-1919. Edited by Anne Olivier Bell. The Hogarth Press, London 1977. p. 270.

The "kitchen table when you're not there," that "symbol which in her vagueness as to what Mr. Ramsay did think about Andrew had given" to Lily Briscoe (TL, 232), identifies Mr. Ramsay's philosophical object with the unobserved. The table is interposed between Woolf's woman-artist and the philosopher, placing the problem of knowledge at the center of Woolf's art[238].

The idea of multiple points of view as presented in Russell's theory of knowledge, was fundamental to the development of Woolf's short stories and novels. As has been seen, the idea of multiple points of view was an idea present in Woolf's narrative from 1917. Prior to this but after 1914, Woolf was attempting to develop a 'modern fiction' where the minds of the characters could be exposed to the reader:

> Woolf too had probed the difficult questions regarding the limits of human knowledge and suggested like Russell that phenomena must be understood only in their multiplicities and not from a single perspective. Especially in "The Mark on the Wall," written three years before "Solid Objects," Woolf called into question a notion which Russell too resisted: that human knowledge is of "cosmic importance" and "that mind has some kind of supremacy over the non-mental universe" (My Philosophical Development 16).[239]

Woolf wanted to show the relationship between human beings including their relationship with nature just as science does; narrative was the medium to achieve it. This new narrative required a new grounding hypothesis regarding its visual content. On the other hand, for Russell, the relationship between the human being and objects was of primary importance rather than the relationship between human beings; he was more interested in the relationships associated to physics rather than psychological phenomena.

Russell was deeply interested in the physical phenomenon that occurs when a certain object is observed from different points of view. His premise was that if an object is being observed by two different observers, the perceptions of both concerning the selfsame object entirely changes due to the different points of view. What Russell called 'sensibilia' were linked with the physical world as possibilities of observation from corresponding perspectives.

There are multiple points of view from which it is possible to observe a certain object. If an observer arrives at a place and takes up a position, then this observer has taken up a possible place from which a 'sensibilia' can be recorded. However, all the other possible viewpoints remain as possibilities of recording 'sensibilia', until another observer arrives and takes up another position. Due to the possibility of the infinite number of viewpoints from which an object can be seen, what Russell calls 'sensibilia' becomes a continuum within space. So 'sensibilia' comes to be the possibilities of perception; Russell expanded this idea until he arrived at the conclusion that each atom could be taken as a possible perspective:

> In Russell's conception, in some sense the private world is already there, like an empty room or chair, to receive the subject and in that sense independent of it, imposing a skeletal framework on his point of view

---

[238] Banfield, Ann. *op cit*. p. 49, note 194.
[239] Holly, Henry. *op cit*. pp 83-84, note 195.

The way in which Virginia Woolf with her narrative creates the space where the characters develop the actions, as Banfield shows, is consistent with Russell's theory of knowledge. Virginia Woolf interacted with Russell's theory and this can be seen in the way the perception of the narrator is conceived, who in any sense is linked with the plot; who sees the actions passing through as images that cannot be modified. How the characters become participants in the plot is by assuming their point of view every time they become participants in the events taking place in the narrative.

So within Woolf's narrative a system of awareness can be seen that is divided into two main units, one by the omnipresent narrator who is not part of the story but is able to see the entire situation, and one of the characters who are part of the story but are incapable of recognizing more than what their thoughts can make sense of. The minds of these characters reveal a certain image of the world, just like the one Russell set out in his theory of knowledge. Each character contributes with his or her own perception of the event, although the scene will never be wholly described.

The Waves has been called one of the most experimental, if not the most experimental, of Woolf's novels. One of the principal reasons for this is because the narration of the events departs from the point of view of the characters and is not by an omniscient narrator. *The Waves* is a book narrated only by the characters. Virginia Woolf had to use multiple characters to give an entire idea of the presented situations. As exemplified, in this novel a situation is presented by the perception of all the characters, except by Percival. This technique is based on Russell's idea of multiple points of view.

The artistic movement known as Post-Impressionism, a phrase coined by Roger Fry, was a link between Woolf's narrative and Russell's theory. At the time this movement was born, artists were thinking of their work as logical knowledge, such as science, able to understand the world and physical phenomena. One of the main exponents of this artistic movement was the French painter Paul Cézanne. He believed in the capacity artists have to understand the world in an abstract way. He thought that this ability would allow the artist to find a logical conformation of the world, a sort of order within it. Cézanne even arrived at the notion that there could be certain equivalences between arts and physics because both areas constantly inquire into natural phenomena.

One of the most important aspects of post-impressionism was the perspective relationship between the canvas and the image being painted, the perspective from where the image was seen. To some extent we can see why post-impressionist art was the linking medium for Woolf's understanding of Russell's theory of knowledge.

Art was the nearest human expression for Woolf to understand the multiple points of view idea

[240] Banfield, Ann. *op cit* p. 73, note 194.

that was fundamental to Russell's theory of knowledge. What she wanted to develop was a narrative with Cézanne's characteristics of composition, where geometry played a major role due to its capacity to provide the sense of multiple points of view. Her narrative, with its interest in post-impressionist painting and her interest in developing the concept of multiple points of view within her narrative, was pointing to the same conception of multiple points of view outlined in Russell's theory of knowledge.

The 1910s were gone and a new decade was beginning. Woolf did not know how much her interactions with Russell and Fry would direct her work in future, but what is noticeable in her works in the twenties is her constant need to show what was happening with her characters from several perspectives.

Now we can see why in *To the Lighthouse* Lily Briscoe wished to have fifty pair of eyes or, as in *The Waves*, Woolf needed to cover the entire space she had evoked by using the multiple points of view technique. Going from one point of view to another while passing from sentence to sentence, Woolf achieves the reconstruction of a common space which the reader is able to see not as a particular experience of each of the characters, but as a common experience of all of them in a continuum space, just like the one set out by Russell with his idea of 'sensibilia'.

2.5. *Woolf and Maps: Astronomy, Motorcars and Airplanes*

Woolf's interest in the concept of map has twofold origins: the boom in the social understanding that the confines of space were much further away than previously believed—which was due to the latest astronomical discoveries—and the inclusion of the motor car in the social sphere. In this section I will use some already mentioned information to show how Woolf, through these two aspects which were social perceptions by the 1920s, was able to understand the concept of map as a tool for the development of her narrative.

By the beginning of the 1910s, for Leonard Woolf as well as for Virginia, it was exciting to live in London. To be there meant they could experience the technological and scientific changes of the epoch. In 1911 Leonard Woolf wrote of his feelings on the revolution in transport. In his city technological improvements such as the motor car and the airplane could be observed as everyday realities, and he was glad to live with these new means of communication. At the same time he also spoke about Einstein, Freud and Rutherford, and how their work had changed our conception of the universe.

The motor car revolutionized the way in which women were able to conceive of the landscape of mobility and in general of independence, through extended horizons. By the end of the 1920s the roads were being mapped and advertised by young women who in the publicity of the time,

assumed the position of intrepid pilots eager to drive forwards towards the discovery of new places.

In the summer of 1927, Leonard and Virginia Woolf acquired a motor car, a second hand Singer. And over the next few months Woolf, who was very enthusiastic about this new technology, was thoroughly immersed in driving and learning about the mapping of roads. The week after buying the car she was writing:

> You won't mind talking for 24 hours on end, I hope? It will be mostly about motor cars. I can think of nothing else. I have driven from the Embankment to the Marble Arch and only knocked one boy very gently off his bicycle. But I would rather have a gift for motoring than anything.[241]

For Virginia Woolf to own this car meant approaching a new experience of the way to understand distances and to perceive visual space. According to Minow-Pinkney 'This new acquisition opened for Woolf an exciting new dimension of life[242]." Although the train was already a quick way to reach other places, what the motor car offered her, and so many others in society, was the sense of freedom in the direction of movement. Even for an average person, the "map of the world" had been altered, and suddenly the world's confines became part of the everyday conversations and everyday thoughts in Woolf's life. She now had contact with a technological device that hitherto had not been part of her world. This new experience gave Woolf the opportunity to understand concepts of the space surrounding her, which she had never felt before. Even the dimensions of London changed with the arrival of the motor car, because to go from one end of the city to another on foot was not the same thing as driving a motor car across it.

In this period, in the words of Holly Henry 'She was fascinated by maps and associated them with motoring and with striking out into the unknown'[243]. The motor car led her to the idea of mapping, not as a geographical resource, but as a technological expansion device which she could later relate to the aesthetic of her work. A few days before buying the car, Woolf was already thinking about the potential offered by this new technology:

> This is a great opening up in our lives. One may go to Bodiam, to Arundel, explore the Chichester downs, expand that curious thing, the map of the world in ones mind. It will I think demolish loneliness, & may of course imperil complete privacy.[244]

She was so excited with the idea of maps that ten days after buying the car she wrote to T.S. Eliot telling him of her experiences with it.

> Did Leonard tell you how our entire life is spent driving, cleaning, dodging in and out of a shed, measuring miles on maps, planning expeditions, going on expeditions, being beaten back by the rain, eating sandwiches on high roads, cursing cows, sheep, bicyclists, and when we are at rest talking of

---

[241] Woolf Virginia. *The Letters of Virginia Woolf.* Volume 3. 1923-1928. Edited by Nigel Nicolson. The Hogarth Press, London 1977. p.400

[242] Minow-Pinkney Makiko. 'Virginia Woolf and the Age of Motor Cars'. *op cit.* p. 160, note 196.

[243] Henry Holly. *op cit.* p. 85, note 195.

[244] Woolf Virginia. *The Diary of Virginia Woolf.* Edited by Anne Olivier Bell. Volume 3, 1925-1930. The Hogarth Press. London, 1980. p. 147.

nothing but cars and petrol? Ours is a Singer.[245]

A striking passage in this letter is how she spent time 'measuring miles on maps'. What can be inferred is that Virginia and Leonard often analyzed the distances and proportions of the road maps between towns and cities. So Woolf became interested not only in the geographical aspect of a map but also, in the abstraction of the earth, in the mental reproduction that she could achieve. The discourse of maps came so close to her life that even in her personal conversations and when she was feeling the need to contact her friends, she referred to the map as a usual concept in her thoughts.

> It suddenly comes over me how I used to hook a piece of paper to me out of the nurse's eye in other illnesses—what a tremendous desire to write I had.
>
> I will use these last pages to sum up our circumstances. A map of the world.
>
> Leaving out the subject of Nelly, which bores me, we are now much freer & richer than we have ever been.[246]

The next feature to consider in Woolf's relationship with maps is her approach to the popular astronomy of the 1920s. Woolf included ideas from cosmology, relativity and the new physics in many of her works. These ideas could have reached her through the readings on James Jeans and Arthur Eddington's best selling books of the epoch or via their BBC radio programs—November 14 1922 was the first BBC broadcast program—that she probably was familiar with. As Gillian Beer reminds us 'Arthur Eddington and James Jeans, Virginia Woolf and Vita Sackville-West, E.M. Foster and Bertrand Russell may each have heard any of the others on the airwaves. Some among the skein we know for certain did so. Who has read whom is no longer (if it ever was) a sufficient question: the relations of the written and the oral are rearranged through the often pseudo-orality of radio, invisibly scripted, purportedly dialogic.'[247]

One thing that drew Woolf to astronomy was the new images from space, especially the one of the earth seen from outer space. After reading James Jeans, a famous popular science writer, and Arthur Eddington, an astrophysicist from Cambridge University, she wrote, 'I wish I hadn't read it already, but shall try again. I read about Stars, and try to imagine what is meant by space bending back.'[248]. She was beginning to develop the material for new narrative strategies where new spatial discourse, which ran in parallel with the new discoveries, can be seen.

In September 1929 James Jean's non-technical book *The Universe Around Us* was published.

---

[245] Woolf Virginia. Th*e Letters of Virginia Woolf*. Volume 3, 1923-1928. Edited by Nigel Nicolson. The Hogarth Press, London 1977. p. 413.

[246] Woolf Virginia. *The Diary of Virginia Woolf*. Edited by Anne Olivier Bell. Volume 3, 1925-1930. The Hogarth Press. London 1980. p.315.

[247] Beer Gillian. ''Wireless': Popular Physics, Radio and Modernism'. *op cit*. p. 150, note 198.

[248] Woolf Virginia. Th*e Letters of Virginia Woolf*. Volume 4, 1929-1931. Edited by Nigel Nicolson. The Hogarth Press, London 1978. p. 266.

Woolf, in *The Waves* and *The Years* (1937), included passages where the interaction with Jeans'
book can be seen. In general, this interaction was based only on Jeans' non-technical books on
astronomy.

Daily newspapers and the weekly literary reviews were fundamental for her acquiring of
information. In fact, two of the journals where Woolf used to published some of her articles, *The
Athenaeum* (Journal of Literature, Art and Science, published since 1828) and the *Nation &
Athenaeum*, whose editor was Leonard Woolf, were major contributors to the divulgation of the
philosophical and astronomical ideas like those of J.B.S. Haldane, Gerald Heard, Bertrand Russell,
and James Jeans.

Another figure essential to Virginia Woolf's channels of information was Ottoline Morrell, who
she used to meet at London and Garsington:

> During weekends spent at Lady Ottoline Morrell's Garsington salon, according to [Judith] Killen, Woolf
> became part of a network of London's intellectuals including scientists and science popularizers, many of
> whom published multiple nontechnical science books on advances in astronomy and cosmology. Killen
> has shown that at Garsington Woolf discussed science, mathematics, and contemporary models of
> cosmology with mathematicians Bertrand Russell and Alfred North Whitehead, Cambridge astrophysicist
> Arthur Eddington, science-fiction writer Aldous Huxley, and his brother, Julian, a geneticist (37, 195).[249]

As can be seen, on several occasions Virginia Woolf had the chance to interact and perhaps even
put forward her own points of view regarding the new discoveries in cosmology and modern
physics, and to hear about the latest advances in mathematics.

It is true that a more conservative criticism until few years ago had visualized Woolf as a writer
with no desire to approach popular culture in general, and popular science in particular. However,
more recent research like Holly's has demonstrated the important role popular science played in
Woolf's generation, including her interests deriving from the vision of the earth from outer space.

In the first decades of the twentieth century cosmological achievements were very widely
publicized, journals and newspapers often circulating ideas on the shape of the universe. Four main
astronomical events made their mark in popular culture.

Two of them regard the American astronomer Edwin Hubble (1889-1953), who from 1919 was
telling the world that space extended beyond our own galaxy, the Milky Way.[250] During the 1920s
Hubble was confirming his hypothesis that the universe was in expansion. The other two most
important events of this period took place in 1910 and 1919, the first being Halley's comet's return
to the vicinity of the earth, and the other the confirmation of the relativity theory provided by the

---

[249] Henry Holly. *From Edwin Hubble's Telescope to Virginia Woolf's "Searchlight"*. In *Virginia Woolf in the Age
of Mechanical Reproduction*. Edited by Pamela L. Caughie. Garland Publishing. 2000. p.142.
[250] However, in 1925 the idea that the Milky Way was the entire universe was still a well-established notion. In
January of that year, the article published by James Jeans in the *Times* still speaks about the universe as the Milky Way.
It took the rest of the 1920s for the notion that the universe was bigger than the Milky Way to be widely known to the
general public, as well as popular science writers.

British Eclipse Expedition.

The atmosphere created by the work of scientists and popular science writers was not only part of Woolf's milieu, it often pervaded almost the entire country.

> Popular audiences in Britain were amazed at the new vistas of intergalactic space captured by improved telescopic technologies. Photographs of spiral nebulae and distant stars, published largely in non-technical astronomy texts, and to a limited extent in the daily press, brought into the public purview spectacular images of intergalactic space. Topics related to cosmology and the physical sciences became inextricably interwoven into public discourse. Daily newspapers such as The Times [London] and the London Illustrated News, as well as review journals including the English Review, London Mercury, and the Review of Reviews, eagerly engaged the public with articles on cosmology, relativity, and the new physics. Such literary journals enjoyed a wide circulation in the early decades of our century…[251]

Some of the most representative articles from 1920 to 1930 in The Times [London] referring to astronomy (apart from the monthly section Stars of the Month) are: 'Religion and Science: The Lesson of Modern Astronomy', August 28, 1924, 'Modern Astronomy', July 15, 1925, and 'The New Planet: Implications for Astronomy; Effect on Halley's Comet', March 15, 1930. On September 13, 1929, the section 'Books of the Week' was advertising James Jeans' *The Universe Around Us*. Furthermore, by 1930 in its section 'Broadcasting: The Programmes', on November 18 and December 2 the newspaper was advertising the series of talks 'The Stars in their Courses' given by James Jeans which were: '…planned to provide a general survey of astronomy for listeners who have no astronomical or scientific knowledge and specially to acquaint them with its most recent developments.'[252]

For the Illustrated London News articles, which were fully illustrated with images of space, the most important of the period were: 'Have Telescopes Reach Their Limit? Astronomy's Problem', January 7, 1922, 'Is There Life on the Planets?—The Answer of Astronomy', April 15, 1922, 'A Star of 10,000 Years Ago: A New Wonder of Astronomy', April 21, 1923, 'Astronomy Explains Wet Weather: Sun Dust as Rain-Collector', August 22, 1925, 'Why Not a Planetarium for London? Astronomy for All', January 1, 1927.

The Athenaeum was an important magazine by the beginning of the past century, with a reputation for publishing only the best literature of the age. Here Woolf published two of her earliest short stories, 'Kew Gardens' and 'Solid Objects'. Furthermore, the magazine not only published literature, but from the end of the 1910s, for some years, it also published articles on subjects such as modern physics and astronomy. Cosmology, Einstein's relativity theory and some experiments on the subject of astronomy were part of the materials used in several publications.

As has been seen, Woolf's interest in the discourse of mapping started early in the century. However, in the 1920s Woolf used this discourse as a tool for the description of the events within

---

[251] Henry Holly. *op cit.* pp. 15-16, note 195.
[252] The Times: Digital Archive 1785-1985.

her narrative. By the end of the 1920s, two of the most representative short stories that reflect her engagement are: 'Flying over London' (1928) and 'The Searchlight' (1929).

Both of these short stories mention a technological device which in those days was becoming very popular, the telescope. By this time, Virginia Woolf had got deeply involved in the vision that a telescope could provide.

> Evidence of her fascination with telescopes and with astronomy surfaces throughout Woolf's diaries and letters. In April 1929, for instance, Woolf wrote of having viewed the "craters of the moon" through a telescope owned by Vita Sackville-West…[253]

In the short story 'Flying over London' the description of London is a mixture of close-ups and long shots. It presents something Virginia Woolf never had the chance to experience, the feeling of watching the earth from the sky. Nevertheless, the images she presents are the reflection of her latest concerns.

> Nearer and nearer we came together and had again the whole of civilization spread beneath us, silent, empty, like a demonstration made for our instruction; the river with the steamers that bring coal and iron; the churches, the factories, the railways. Nothing moved; nobody worked the machine, until in some field on the outskirts of London one saw a dot actually and certainly move. Though the dot was the size of a bluebottle and its movement minute, reason insisted that it was a horse and it was galloping, but all speed and size were so reduced that the speed of the horse seemed very, very slow, and its size minute. Now, however, there were often movements in the streets, as of sliding and stopping; and then gradually the vast creases of the stuff beneath began moving, and one saw in the creases millions of insects moving. In another second they became men, men of business, in the heart of the white city buildings.
>
> Through a pair of Zeiss glasses one could indeed now see the tops of the heads of separate men and could distinguish a bowler from a cap, and could thus be certain of social grades—which was an employer, which was a working man. And one had to change perpetually air values into land values.[254]

The 'Zeiss glasses' provide an amplification of the city, and the use of them within the narrative reflect how the ideas of telescope and mapping were being used together for the description of an image, in this case a city seen from above. Woolf maintained that the telescope had a determinant effect on the aesthetic of any person who was confronted with the images it provoked. Woolf used the telescope as a tool to achieve her latest goal within narrative, to map the world from above; just as she liked to do with her motor car and the roads. With these two technological devices, motor cars and airplanes, Woolf was able to map the earth from two different perspectives.

The following year Woolf published 'The Searchlight', again a story where two of the main devices used for the narrative are a telescope and maps. In the story the great-grandfather of Mrs Ivimey explained to her how when he was a boy his father let him look every night into the telescope and study the maps of the universe:

> 'It must have been there,' she resumed, 'because, he told me, every night when the old people had gone to

---

[253] Henry Holly. *op cit.* p. 57, note 195.
[254] Woolf Virginia. "Flying over London". In *Virginia Woolf Selected Essays*. Edited by David Bradshaw. Oxford University Press. 2008. p. 210

bed he sat at the window looking through the telescope at the stars. Jupiter, Aldebaran, Cassiopeia.' [255]

Until one day he decided to look towards the earth.

'He focused it upon the earth. He focused it upon a dark mass of wood upon the horizon. He focused it so that he could see…each tree…each tree separate…and the birds…rising and falling…and a steam of smoke…there…in the midst of the trees…And then…lower…lower…(she lowered her eyes)…there was a house…a house among the trees…a farm house…flowers in them blue, pink, hydrangeas perhaps…' she paused…'And then the girl came out of the house…wearing something blue upon her head…and stood there…feeding birds…pigeons…they came fluttering round her…And then …look…A man…A man! He came round the corner. He seized her in his arms! They kissed…they kissed! [256]

Virginia Woolf through the lens of the telescope achieves the mapping of miles and miles of distance. Woolf makes a comparison between the map of the earth and the map of the universe, the latter recently re-defined. The same year Hubble was announcing the expansion of the confines of the universe, Virginia Woolf was also considering it as a relevant theme for human perception.

The astronomical discoveries of the 1920s led to a sense of anxiety in many readers of popular science. The implications of an awareness that the extent of the universe was much greater than had previously been believed were not easy to grasp, because the earth thus became such a tiny part of the universe, and human beings apparently so much less significant. As a result of this, a re-scaling of the earth took place.

Certain advances in cartography and mapping, such as those of the interwar years, when orthographic maps[257] underwent considerable development mainly through the military sector, were useful for the new interpretations of the earth in particular and the universe in general. One of the practical consequences was that the popular science public reached a better understanding of the earth's form and its size in relation to the universe.

The short story 'The Searchlight' is a contribution to the understanding of these modern maps and technology meant to create awareness of the universe's immensity and the shape of the earth within it. It is able to show how globes and maps were linked for the re-scaling of humanity and the universe. The strategies used by Woolf to develop her narrative are linked to a cartographic discourse of the beginning of the 20th century.

2.6. *The Spatio-Temporal Map*

The development of simultaneity, multiple points of view, and maps were above all the result of Woolf's interaction with fields of knowledge such as philosophy, art and science, and with

---

[255] Woolf Virginia. *A Haunted House: The Complete Shorter Fiction*. 'The Searchlight'. Vintage Classics. *2003*. p. 264.

[256] Woolf V. 'The Searchlight'. *op cit*. p. 266, note 255.

[257] An orthographic map is a cartographical projection that allows a visualization of the earth from an infinite distance. In this projection the earth is seen from one of its hemispheres from outer space. The horizon then becomes a circle.

technological innovations such as the motor car, cinema, the airplane and wireless technology.

For the development of the narrative in books such as *Jacob's Room*, *Mrs Dalloway*, *To the Lighthouse* and *The Waves*, Woolf used two—in the case of *Jacob's Room* and *To the Lighthouse*— or three—in the case of *Mrs Dalloway* and *The Waves–*, of the above mentioned topics. In *Jacob's Room* it can be seen that the multiple points of view strategy as well as the mapping discourse is a constant within the narrative. The same effect occurs in *To the Lighthouse*, where the concepts of multiple points of view and simultaneity are also fully explored by Woolf.

In the sections so far it has been seen how, from the second half of 1922 and onwards until Woolf finished writing *The Waves* by the beginning of 1931, her interaction with particular fields of knowledge was a determinant for her narrative strategies and themes. And when Woolf, together in a single piece of literature used all three notions, a narrative structure that considers the three subjects for the developing of the story will be fully explored. In a sense Woolf constructed a map which described more aspects of the space where the actions took place than just the geographical location. Including the concepts of multiple points of view and simultaneity in time, the space that Woolf described in her narrative became more accurate, it became a 'spatio-temporal map', able to embrace more precisely the events occurring within her narrative.

This spatio-temporal map she used allows the reader a more comprehensive understanding of the situations within the book. In this way, the reader is able to get to know the characters better, as well as the situations in which they are immersed:

1. Several points of view:

In the case of *Mrs Dalloway* the reader gets to know the characters through three different ways: from what the omniscient narrator relates, from what the characters are able to say about themselves and from what other characters of the story are able to say about them. In the case of *The Waves*, the omniscient narrator does not exist so the reader learns about the characters only by what they say and what other characters say about them.

Furthermore, in both stories the concept of multiple points of view is applied to portray, in the case of *Mrs Dalloway*, spatial places which are the various places of London such as Bond Street, Regent's Park, and Trafalgar Square, to mention just a few. And in the case of *The Waves*, the concept of multiple points of view is useful to portray the characters through the thoughts of other characters; this means that for example the reader only knows about the character Rhoda by what the other characters think and feel about her.

2. Simultaneity: Woolf's technique allows the reader to learn about other characters and their situations at a precise moment in time, which can happen in the same place, as in the case of *The Waves* and *Mrs Dalloway*, or in other spatial places, as in the case of *Mrs Dalloway*.

3. Mapping. The reader is able to learn of the spatial position of the characters; Woolf constructed the maps of cities by being very specific in describing the streets and the places where the characters were. Furthermore, she was very precise in indicating the time (in the case of *Mrs Dalloway* by the sound of Big Ben) to show how long the characters take to get from place to place.

Virginia Woolf identified "party consciousness" in *Mrs Dalloway*, *To the Lighthouse*, and *The Waves*, where a certain number of characters are reunited within a spatial location, and by their simultaneous interaction via thoughts and actions achieve the description of the situation that is taking place. Thus the narrative becomes a combination of the thoughts of the characters, their 'interior monologues', and the actions occurring among them.

Within the idea of "party consciousness" the concepts of multiple points of view and simultaneity are both contained. Furthermore, if the notion of mapping (in the sense of a portrayal of a scene) is added for the description of a certain situation, the result is that a specific narrated event can be thought as a " multiple consciousness map".

In this "multiple consciousness map" the situation and the actions that the characters are developing, can be understood by the reader with greater precision. By including elements such as simultaneity and multiple points of view within the mapping, within the description of the events, the narrative is able to achieve greater accuracy in a presented scene mostly because the thoughts and actions of the several characters that were spatially situated in different positions, were considered at the same time. With the inclusion of the above-mentioned concepts, the events portrayed did not reflect just one individual perspective, as usually happened before modernist literature, when omniscient narrators describing the spatial surroundings did it from their own particular point of view and did not leave room for any other contribution as to how the events were developed from the characters own point of view.

In Woolf's work the different contributions of the characters—their interior monologues, their actions and the simultaneous contribution of each character from their own point of view— contribute to map a situation, to define it better, to achieve a clearer and more descriptive view of the events. As has already been shown in *Mrs Dalloway* and in *The Waves*, there are many scenes where the thoughts of the characters, their actions, and the descriptions of the places where the actions are taking place, provide the reader with a richer picture of the events.

If now different events are happening to different characters at the same time, another description, another mapping of the situations can be made. For this purpose the notion of what I will call a "map of maps" can be useful. In this "map of maps" within London, two different characters are located in different places, for example one is at Regent's Park while the other character is at Buckingham Palace, and each of the characters describes their own situation at the

same time. The characters, while letting the reader learn of their actions, are providing a spatial description which gives the reader information such as the places where the actions are taking place, the colours, sounds, and smells of the streets where they are located and the precise moments when these events are happening. And if other characters provide the same kind of spatial information, but from other points of the city simultaneously in time, then what is achieved with this narration, what the characters are reproducing is a map of London. If this kind of narrative, which embraces different visions from different spatial points within a city could be expanded ad infinitum, then the entire city of London could be reproduced by a narrative tradition.

In narrative, the idea of a "map of maps" taken to its ultimate consequences would be equal to the idea proposed by Russell, where only by multiple observers is it possible to describe a place with certain accuracy. For Russell to map an entire space, such as a city, would mean occupying every available atom within the city from where a different perspective could be obtained to achieve an accurate description of it. The "map of maps" is a map capable of obtaining an accurate description, based on a multiple points of view perception, which is provided by each of characters that are situated in different spatial places. And if all of them make a contribution at the same precise moment, simultaneously in time, then an entire space such as the city where the actions are taking place, can be defined much better.

In Woolf's short story 'Flying over London', the close ups and long shots of London reflect the narrative Virginia Woolf was pursuing in the second decade of the 20th century with the inclusion of her concepts of simultaneity, multiple points of view and mapping; Virginia Woolf needed 50 or more observers of the events at the same time and in the entire city to describe a particular moment.

The combination of these three ideas within the narrative, before the modernist writers, had never been seen. The spatial-temporal map that Woolf achieved in *Mrs Dalloway* and in *The Waves* is a narrative technique that was used before only by James Joyce in *Ulysses*. The way Woolf presented this strategy was completely different from what had hitherto been done in literature. Woolf was able not only to develop a very precise narrative on the times and paths followed by the characters and on the reproduction of the cities, but she also offered a much more realistic description of the events that happen within the continuum of time and space. She achieved an approach to narrative of what actually is felt in the daily life of a human being who is a participant in the complexity of the time and space continuum, where sounds, smells, images, thoughts and actions are all of them happening at the same time. Furthermore, she expands this experience not only using one character but many, who were at the same time perceiving the same kind of experience.

Conclusions

In this chapter three ideas that Virginia Woolf developed in her narrative in the early 20th century have been shown. These ideas did not exist separately from each other, in fact, the three of them belong to a more complex idea, the 'spatio-temporal map'. The idea of multiple points of view, simultaneity and mapping are fundamental concepts within Woolf's narrative of the 1920s. At that time, these three concepts were at a crossroads of fields of knowledge (all deeply involved in shaping them) like philosophy and science, as well as technological advances that helped on the recognition of these ideas.

The concept of multiple points of view can be found in *Jacob's Room*, *Mrs Dalloway*, *To the Lighthouse* and *The Waves*. Virginia Woolf here used the concept of multiple points of view in various ways, from the conception of the main character only through what the other characters can tell about him, passing through the different perspectives that the narrator and the characters of the book could have about the same scene, to the various perspectives used to describe an object. A narrative strategy that Virginia Woolf developed was the 'party consciousness', useful to describe a certain scene from the particular points of view of the presented characters.

In the 1920s the concept of simultaneity within Woolf's narrative is a concept developed in three different books: *Mrs Dalloway*, *To the Lighthouse* and *The Waves*. Through *Mrs Dalloway* the idea is constantly present, and the symbol of it is Big Ben, which marks the passing of time. In *To the Lighthouse*, as has been seen in the example given, the simultaneity of thought and action where a group of people is reunited takes place. The same phenomenon occurred in *The Waves*. Also in *To the Lighthouse* actions that are happening simultaneously in time take place, as when Lily Briscoe remains at the summerhouse to finish the painting while the Ramsays go to the lighthouse.

The idea of mapping within Woolf's narrative was developed by Woolf for the first time in the novel *Jacob's Room*. We find an effort to map the streets and the places where the actions took place, Woolf manages to create a map of London with the narrative as her main resource, the same phenomenon occurring in *Mrs Dalloway*. And in both cases the map not only includes a geographical map but also one where the sounds and the smells of certain avenues and streets can be recognized. Woolf asks the reader to use his/her imagination to map the city, including its smells and sounds. Although in *The Waves*, the idea of a map able to describe the places and the streets is not fully developed, Woolf kept using certain sounds and smells within a certain circumstance to describe better what was happening within a spatial place.

These three ideas were developed within a social context in which Virginia Woolf was immersed. The three ideas have an origin, connected to Woolf's interactions with philosophers, popular science writers, and scientists, and with the contemporary technology in London exemplified by motor cars, wireless technology and cinema.

The idea of multiple points of view that Virginia Woolf developed in her books has been related to the ideas of the philosopher Bertrand Russell and his theory of knowledge, developed in the pre-war years. As a fundamental connector of the philosopher and the writer the figure of Roger Fry was important. One of the ideas of this theory of knowledge was that of 'sensibilia', which as far as can be seen, Woolf used to understand the nature of an object from multiple points of view.

Virginia Woolf was immersed in a society that saw some of the first developments of contemporary technology such as the airplane and the motor car. She heard several of the first radio programs and went to the cinema to watch the first movies. As Marinetti had anticipated, all these modern technological improvements had deep repercussions on the psyche of society, and Woolf was no exception. The concept of simultaneity grew in this environment and Woolf captured it in her novels. The omnipresent sound of Big Ben in *Mrs Dalloway* and the descriptions of the chaotic streets of London in some of her novels, are the result of simultaneity events: what Woolf named as the 'unexpected beauty' that the cinema could provoke in the audience.

In the 1920s science, especially astronomy, brought some discoveries to the scene, which also served as material for the growth of some ideas in Woolf's narrative. This and the technological devices such as the motor car and airplanes were fundamental for Woolf's consideration of the concept of map as a powerful descriptive tool that could be employed in her narrative.

The astronomical discoveries of Hubble were part of a recognition of borders, or better, the lack of them in the outer universe. In addition, the motor car was important because the idea of the map was deeply linked with the confines that could be extended and explored with this technological device. In the mind of Woolf the motor car came to be associated with a new way of experiencing space. Furthermore, the imaginary vision that the airplane provided to Woolf's narrative was a determinant in the mapping of the earth from another perspective that was not yet commonly understood. Finally, the telescope came to give Woolf's narrative different perceptions for the mapping of a certain city, and was also useful for the re-scaling of the form of the earth and its size compared to the rest of the universe.

For Woolf, the decade of the 1920s represented a constant dialogue with other fields of knowledge. In this period, Virginia Woolf was able to abstract three main ideas into her narrative. And when she used them together in the same book, the result was a narrative strategy able to achieve a much more comprehensive understanding of the events. Before Joyce, this narrative technique had never been used, and Virginia Woolf did it in an exceptional way, she was able to narrate a very accurate story where a spatial-temporal map was created. This narrative technique included concepts of fields of knowledge such as science, philosophy and technology, which were being currently re-conceptualized.

Chapter 3

The Structure of Time in Thomas Mann's The Magic Mountain[258]

In this chapter I show how Thomas Mann in *The Magic Mountain* analyzes the concept of time and space from both a scientific and an artistic point of view. This duality, the artistic and the scientific analysis, is a constant in Mann's book for the understanding of natural as well as social phenomena. And it is especially in the concept of time that Thomas Mann emphasizes this analysis.

The Magic Mountain reflects a deep affinity with science; it is a scientific novel dealing with some of the most representative dilemmas of modernity in fields of knowledge such as biology, medicine, anatomy, physics etc. Nevertheless, in the topic of time, throughout the book there is recurrent criticism not of science as a whole, nor of current theories of time, but of the starting point of Einstein's relativity theory. Thomas Mann saw a more fundamental problem that had to be analyzed before measuring time: how may a human being feel the passage of time? The tools employed by Mann to achieve his criticism of Einstein's theory are based in the constant support of both the scientific and the artistic discourse.

Thomas Mann spent twelve years writing *The Magic Mountain*, from 1912 until 1924, a crucial period for Western civilisation, when the horizons of science were expanded and German society's perception of it changed considerably. Furthermore, scientific and mathematical ideas became part of contemporary culture, and artistic movements like Modernism interacted with ideas of space and time in a very sophisticated way. In this process authors like Mann made central use of ideas of a relative time and an infinite space in the development of their narrative.

The author's considerations on several themes and topics relating to science, such as the credibility that sciences were acquiring as knowledge systems when compared to religion, his opinion of new technologies like X-rays, medical developments, and phenomena like the capacity of the mind to move objects, make *The Magic Mountain* a concise manifestation of some of the main ideas that were changing the role of science and technology in European culture and society by the end of the 1910s and the beginning of the 1920s.

In his novel Thomas Mann dealt with various areas of study, supported by both scientific and philosophical arguments. Examples are the micro representation of the political and social circumstances of European culture, biology, medicine and physics, as well as profound reflection on and recognition of some basic concepts of space and time, the latter topic being what this chapter will be focused on.

---

[258] Mann Thomas. *The Magic Mountain*. Vintage. 1996. Translated from the German by John E. Woods.

Deriving from ideas such as an infinite space and a relative time, one of Mann's main concerns in *The Magic Mountain* has to do with the recognition of time as a phenomenon which cannot be objectively measured. As a consequence of this subjectivity, the characters and particularly the protagonist of the novel Hans Castorp, during his stay at the Berghof Sanatorium, will have a relativistic perception of the flux of time. To a lesser extent Mann outlines the idea of a perception of infinite space, something that Hans Castorp will experience on the mountain in the course of the narration. In this sense the protagonist will be confronted with a space that cannot be objectively measured.

The concepts of a relative time and an infinite space became part of Western culture due to the efforts of thinkers like Albert Einstein and Oswald Spengler. In the figure of Hans Castorp—an engineer, a man of science, an inquirer into nature—and with the help of two other characters, Herr Settembrini and Naphta, who throughout the novel constantly help Castorp to be aware of the spatio-temporal situation at the Berghof Sanatorium, Mann represents the way in which the society of the period was recognizing these two new conceptions of time and space.

Hans Castorp's scientific and engineering background is reflected in the methodology behind his thinking. His being a recent graduate in engineering, engineers at that time emerging as significant social figures, is valuable for the interpretation of modern scientific ideas within a culture. By the beginning of the 20th century engineers, scientists, doctors and in general men of science were increasingly social figures with the authority to pronounce on nature.

The first section of this chapter will present the scientific characteristics of some of the characters, and some notions of space and time emerging in the narration of the events. The main character, together with other characters, suffered from these modern notions of time and space during their period on the mountain. Finally, some reflections Mann revealed regarding science and its interaction with society will be presented.

What concepts did Mann employ, and how did these concepts work within his narrative? The second section of the chapter deals with this question. The idea of a relative time is one that was in the process of being defined in this period, and was at a crossroads of different fields of knowledge, from philosophy and history to science and technology. Philosophers such as Henri Bergson and Oswald Spengler and the physicist Albert Einstein were fundamental to this endeavour, for the recognition of a relative time within *The Magic Mountain*. Not all of these three thinkers may be directly related to the book nor with Thomas Mann, but their ideas were fundamental to a modern recognition of a relative time within Mann's novel.

In the second section of the chapter three topics will be presented as important for Mann's recognition of a relative time. First, the role Oswald Spengler played for the recognition of relative

time as a notion within Western culture. Second, how Henri Bergson provided Mann with the conception of event duration will be shown. Third, Einstein will help Mann to explore a basic human problem: the measurement of time.

The idea of a relative time in *The Magic Mountain* is an idea embedded in the scientific atmosphere of its milieu, and its representation in literature as a fundamental notion in Western culture derives mainly from Bergson's philosophical contribution and Spengler's notion of time. It will be seen that in the end these ideas will confront Einstein's contributions.

3.1. *The Magic Mountain*

3.1.1. *Hans Castorp*

The story begins with a visit by the main character to his cousin Joachim Ziemssen, at a sanatorium for people with tuberculosis. He was supposed to stay in the sanatorium for just three weeks, but due to a series of unexpected events, he has to remain there for another seven years. When he arrives at the sanatorium he is a young man of 23 years, who as a student had a talent for mathematics, which led him to study engineering.

According to Mann's biographer Hermann Kurzke, Thomas Mann had no interest in engineering "But all his life Tommy was unable to find any interest in technology. That they "crashed most interestingly" is the only information he handed on about his trains."[259], nor much knowledge of it. "He [Castorp] studies engineering—about which Thomas Mann understood nothing..."[260] However, as will be seen in the following chapter, to portray the protagonist of the story he at least needed a certain degree of knowledge about science and technology.

While Castorp was preparing himself to becoming an engineer, he studied aspects of applied mathematics. In the end this approach to solving daily problems resulted in a framework to understand the world. Castorp sees the world through the eyes of an engineer, and his approach to the several situations he found himself in, will be characterized by the same attitude.

> His brain, which worked calmly and slowly—particularly since Hans Castorp retained the habit of drinking porter with his morning snack—gradually filled up with analytical geometry, differential equations, mechanics, projective geometry, and graphical statistics. He calculated displacements—with full cargo and empty—stabilities, shifts in trim, and metacenters…[261]

Mann seems to have a broad idea of the problems engineers would deal with by the beginning of the 20th century. Perhaps the notions he had about an engineer's education came from the six years he spent studying to become a merchant before he was 19 years old, although he never obtained the

---

[259] Kurzke, Hermann. *Thomas Mann, Man as a Work of Art: A Biography*. Translated by Leslie Willson. Princeton University Press. 1999. Translated in 2002. p. 11.
[260] Kurzke H. *op cit*. p 303, note 259.
[261] Mann Thomas. *The Magic Mountain*. *op cit*. p. 34, note 258.

diploma.

> Since he was to become a merchant, he did not attend the humanistic branch but rather the mathematical-scientific branch. In March 1894, after the fourth year (twice), the fifth year, and the sixth year (twice) of secondary school, he left at the age of almost nineteen, with the authorization for one year of volunteer military service but without graduating.[262]

When Hans Castorp asks for some books, they are on scientific subjects such as anatomy, physiology and biology, as well as the book on naval engineering, *Ocean Steamships*. From these studies we see that Castorp thinks of human beings as a kind of device that works according to the laws of mechanics. While studying anatomy, he wonders if the laws of mechanics, which he had learned while studying to become an engineer, could be applied in their entirety to the human body and its functionality.

> It would surely have been childish to think that the engineering sciences and the laws of mechanics had been applied to organic nature, any more than one could say that they had been derived from it. They were simply repeated and corroborated in it. The principle of the hollow cylinder dominated the structure of tubular bones to such an extent that static requirements were satisfied with the precise minimum of solid material.[263]

The narrator notices how 'childish' it would be to think that the rules of mechanics govern the human body, yet if the laws of mechanics can describe organic nature, then it would also be possible to think that these laws would enable us to describe the processes of the human body. The adjective tubular used to describe the bones of the body is a clear reference to the body as a human machine.

Hans Castorp is a scientist in a double sense, in that Thomas Mann created a character with attributes of a scientist, and the description of the character is also scientific. Castorp is a natural enquirer, and during his period at the Berghof sanatorium, he is interested in anatomy, physiology and biology. He is deeply interested in how the human body works, its life and its death. He has a mechanistic conception of the way a body functions, although he realises the limitations of this conception in the explanation of concepts such as white and grey matter; he regards this kind of process as mysterious. For Castorp, the human body is a great example of symmetry and functionalism:

> Consider the marvellous symmetry of the human frame, the shoulders and the hips and the breasts as they blossom at each side of the chest, and the ribs arranged in pairs, and the navel set amid the supple belly, and the dark sexual organs between the thighs! Consider the shoulder blades shifting beneath the silky skin of the back, and the spine descending into the fresh doubled luxuriance of the buttocks, and the great network of veins and nerves that branch out from the trunk through the armpits, and the way the structure of the arms corresponds to that of the legs[264].

Another activity with which Castorp occupies his time while staying at the sanatorium is the

---

[262] Kurzke H. *op cit.* p. 2, note 259.
[263] Mann Thomas. *The Magic Mountain. op cit.* p. 276, note 258.
[264] Ibid p.337.

making of a scientific catalogue of flowers. He remains enough time to complete the four seasons of the year, and just as a biologist would do, he follows a rigorous scientific method for the collection of his flowers and meticulously registers each piece he collects:

> Hans Castorp counted, probed, and compared; he investigated the structure and placement of sepals and petals, of male and female sex organs, compared them to diagrams and illustrations, determined to his satisfaction that the structures of plants he knew were scientifically correct, and then proceeded to those whose names he did not know, identifying them with his Linnaeus according to class, cohort, order, family, genus, and species.[265]

He studies the sky and its movement during an entire year, he studies biology, astronomy, and he uses terms such as 'crystallometry' and 'hexagonal symmetry' to denote the structure of the snow; a clear theme which constantly recurs in his thoughts is the symmetry that can be found within nature.

His mentality has such a scientific grounding that he is able to understand painting not only as an artistic but also as a purely medical activity, just as Leonardo Da Vinci did. In the description of the human body can be read Mann's interest in art as a 'scientific' activity. This means that Hans recognises in painting a way of representing the human being, and science must participate in this representation.

On one occasion a gramophone arrives at the sanatorium and Hans spends entire nights listening to the music that came with it. He takes his time learning how to use it to perfection. He even arranges the discs and classifies them all. Inside the sanatorium he becomes the guardian of the music, due to his desire to have the music organized. For a period of time the gramophone becomes the science, or better the technology, he studies. However, he could not understand how it worked, he continually asked himself how a sound-box was able to repeatedly reproduce, over again, the sounds, how this technological instrument could emit sound. Even in his dreams Castorp used to think about this issue. The themes contained in the book reflect how Mann was not only concerned with the science of the time but also how deeply interested he was in technology, especially modern technological devices such as the gramophone or X-rays.

> And yet in his dreams, no less than when he was awake, Hans Castorp was unable to comprehend it: how could these rich combinations of harmony now filling his sleeping ear be re-created simply by tracing a line, fine as a human hair, above an acoustic chamber, only by the vibrating membrane in the sound-box?[266]

In the book's last pages can be seen Hans Castorp's attitude to rationalism, and certain ideas predominant in the Middle Ages, such as alchemy. Through some psychological experiments conducted by Dr. Krokowsky, Castorp wonders about the difference between modern medical science and the magical alchemist, and he is unable to exactly define the differences between these two human activities.

---

[265] Ibid. p. 363.
[266] Ibid. pp. 631-632.

In the course of the narrative, science and the humanities get closer, and it is in the character of Hans Castorp that this can be seen. Concerned with questions about how nature works, and natural phenomena in general, he is analytical and scientifically methodological but he is also concerned with philosophical questions and the possible answers to 'What is life?', a question he reflected on long enough up on his mountainside. One possible answer to this question, that recurs throughout the novel, may be linked with the recognition of time.

The character of Castorp constructed by Mann is of a man able to understand the world from a scientific point of view, understanding that natural phenomena can be explained starting from our scientific knowledge; Hans is a man who uses science and technology as a source of knowledge to understand the world. Modern science needed three hundred years to achieve recognition as a fundamental tool for our understanding of natural phenomena, and Castorp is like a pioneering figure, almost fully accepting its power. And if he did not fully accept the power of science it was not because he did not want to, but because still, in certain circumstances, to understand natural phenomena such as X-rays or the gramophone, the necessary information was not yet available.

One of Castorp's main concerns while on the mountain is the feeling of time and its relation to space. The approach he took up to grasp this issue, as well as all the other themes he tried to deal with and solve on the mountain, is supported by science. When he speaks about measuring time he gives very eloquent scientific answers. Furthermore, some of the times when the character is wondering about this subject, he enjoys moments of illumination, moments where he is able to see nature as a whole. In these moments, his awareness of the nature of time and space increases.

When he had just arrived at the Berghof Sanatorium he promptly experiences a sense of timelessness in the atmosphere of the mountain. He comes from a 'flatland' where time is constantly measured by clocks, calendars and many other features that set out and achieve a constant continuity of time. But he has arrived at a place where all the other characters are conscious of the former characteristic of timelessness, although it seems that for none of them this is important, because life has a different rhythm there and the characters are used to it.

> Such an ambience of timeless space is, of course, at the heart of the Berghof experience. The sanatorium world, like the world of Shangri-La in Hilton's *Lost Horizon*, achieves a sense of timelessness through its physical isolation from the everyday world. Not only does Castorp seem to appreciate the sense of time— the timelessness—which the Berghof maintains, but he also feels almost immediately comfortable speaking with Settembrini. Castorp assumes gradually and without much difficulty, the carefree, almost Bohemian, approach to life and time at the sanatorium[267].

One of the most important elements for the achievement of timelessness is the fact that on the mountain the landscape is completely covered with snow. Here the seasons of the year actually

[267] Walter Hugo G. *Space and Time on The Magic Mountain: Studies in Nineteenth and Early-Twentieth Century European Literature*. New York. Peter Lang Publishing 1999. p. 111.

cannot be differentiated one from another, so the measurement of time from a natural point of view cannot be achieved due to the lack of spatial changes to indicate temporal ones. The only way to measure activities within the sanatorium is to rigorously impose the hours when meals have to be served. The monotony that these habits, and others, create, will influence the sense of time that will in the end develop into timelessness. Hans Castorp is immersed in this new atmosphere and he will adapt himself to the spatial as well as temporal constraints of the mountain.

In this new context Castorp has to develop a new way of perceiving time and its flux. For this new perception some of the characters such as his cousin Joachim, and Settembrini, will participate. Both of them, in a theoretical and also a practical way will be part of the new conception of time that Castorp will feel after spending some years on the mountain. Settembrini, the first person after his cousin with whom Castorp established a relationship in the sanatorium, will provide the protagonist with some tools for the understanding of the timeless sensation. For example, on one occasion when music comes to be the medium through which an awareness of time could be felt, Joachim says about music:

> But it is an enjoyable change. It fills a few hours up so nice and properly, I think. It divides them up and gives some content to each, so that there's something to them after all—whereas normally the hours and days and week hang so awfully heavy on one's hands. Such an unpretentious concert piece lasts perhaps seven minutes, am I correct? And each piece is something all to itself, has a beginning and an end, stands out in contrast to the rest, and that is what keeps them, in some sense, from being swallowed up in the general routine. And, besides, each is then divided up into several parts itself—into melodic phrases, and those by the rhythm itself—so that something's always going on and every moment takes on a certain meaning that a person can hold on to, whereas otherwise—I don't know if I'm putting it right, but…"

> "Bravo!" Settembrini cried. "Bravo, lieutenant. You have described very nicely and indubitably moral element in the nature of music: to wit, that by its peculiar and lively means of measurement, it lends an awareness, both intellectual and precious, to the flow of time. Music awakens—…[268]

Settembrini, when speaking to Joachim, mentions one characteristic of music, which is its ability to measure time; that music is a 'means of measurement' of the time. Furthermore, according to Joachim, music is able to provide a certain structure for time by the way it 'divides' the hours up. So both characters agree that music is a measurer of time due its capacity to give a structure, to divide it into symmetrical periods. However, as we find later on, if measurers of time such as music cannot be provided, then human beings are incapable of feeling the flux of time. This kind of conversation, where philosophical as well as scientific elements are present, begins to create a specific perception of time and space in Castorp.

The second three weeks Castorp spends in the sanatorium he is sick. In this period of time his perception of timelessness grows due the monotony of the condition in which he was immersed; the sense of the flux of time could not be felt from a bed where no differences in the perception of the

---

[268] Mann T. *The Magic Mountain. op cit.* p. 109, note 258.

spatial conditions could be established.

This period marks the moment in which Castorp starts to get used to the timeless sensation and the way in which events happen inside the sanatorium. From here onwards he will be unable to recognize the seasons so the measurement of time will no longer be possible. By the tenth month Castorp partly recognises that there is a slight though almost imperceptible change in the weather. The only way certain changes can be noticed is due to events happening in the 'flatland', such as the death of his great-uncle Consul Tienapple, or the beginning of the war, which happens by the end of the novel.

When Hans Castorp had recently arrived in the sanatorium he had started questioning from several points of view the way in which the human race can possibly measure time, how can it be felt and what the conditions are that enable us to sense that feeling? However, as time goes by, his attitude towards the passage of time starts to change into complete indifference. After 7 years in the mountain, he is almost incapable of feeling the flux of time.

At first, while in a conversation with his cousin Joachim, he thinks fluently on differences between time and space. He says that the feeling of time is what we are able to recognize, we can feel if a minute went quickly or if it took too long, but the human race has not been naturally provided with a sense to recognise the passage of time; for a human being time is not measurable whereas space can be measured by senses such as vision and touch.

> We perceive space with our own senses, with vision and touch. But what is the organ for our sense of time? Would you please tell me that? You see, you're stuck.[269]

As the conversation with his cousin continues Castorp wonders if a human being can be really sure time flows uniformly. He arrives at the conclusion that the human race is not able to provide a precise answer, the only thing to be done is to agree about it, to agree that an hour is an hour and that a minute is a minute, to impose an arbitrariness of the measuring units although, on the mountain, he couldn't recognize this phenomenon. In the following quotation Mann is trying to make us realize how Castorp was feeling the flux of time on the mountain, or better, the absence of it.

> But how are we ever going to measure something about which, precisely speaking, we know nothing at all—cannot list a single one of its properties. We say time passes. Fine, let it pass for all I care. But in order to measure it…no, wait! In order for it to be measurable, it would have to flow evenly, but where is it written that it does that? It doesn't do that for our conscious minds, we simply assume it does, just for the sake of convenience. And so all our measurements are merely convention, if you please.[270]

Another philosophical question raised in the novel concerns progress, which depends upon motion. For Castorp, one inherent characteristic of motion is circularity. This phenomenon can be

---

[269] Ibid. p. 64.
[270] Ibid. p. 64.

captured in space and time through periodicity and the conservation of mass.

> "All motion is, however, circular," Hans Castorp said. "In both space and time, as we learn from the laws of periodicity and the conservation of mass. My cousin and I were speaking about that earlier. Can one speak of progress when motion is a closed system without any direction? When I am lying there of an evening and observing the zodiac—the half of it that we see, that is—and think back to those ancient wise people—"[271]

These are examples of how Castorp conceptualises and solves questions by applying the concepts of physics and mixing them with social phenomena. As we see above, Castorp's thoughts are framed by science, the way in which he answers questions and mixes several ideas in one, always point to science as the right resource for solving questions. His questions regarding nature will have answers containing insights into the scientific ideas of the period, and this can be extended to answers of questions on space and time.

Herr Settembrini and Naphta both represent certain aspects of European society and they both try to influence the experiences of the main protagonist of the book. They play an especially strong role in what refers to science and its social acceptance, symbolising a division in society where on the one hand science meant the knowledge of future generations and on the other it signified no more than the opposition to religion and morality.

3.1.2. *Herr Settembrini and Naphta*

These two characters confront Castorp, and will direct his beliefs on themes such as progress, science and human development.

Herr Settembrini is ill, just like every other person in the sanatorium. He is a humanist, an Italian student of the poet Carducci. He argues the case for the month as the lowest measurement of time on the mountain:

> "We do not know the week as a unit of measurement, sir, if I may be permitted to instruct you. Our smallest unit of time is the month. We measure on a grand scale…"[272]

Settembrini is aware of the arbitrariness of the flux of time and how its measurement depends only on the necessities of human beings. On the mountain the measurement of events was not necessary in reduced periods of time such as days or weeks, so the smallest unit of time came to be the month.

Settembrini thinks that criticism is the starting point for progress and enlightenment: 'Malice, sir, is the spirit of criticism; and criticism marks the origin of progress and enlightenment'[273]. The flags used in his humanist vision are reason and enlightenment, the power that is able to break with

---

[271] Ibid. p. 376.
[272] Ibid. p.56.
[273] Ibid. p.58.

superstitious. Settembrini is in favour of technology and new forms of transport not because of their role in progress, but because of their tendency to enable us to achieve moral perfection. However, he was also able to see the danger in the misuse of technology:

> Settembrini, as man who formed opinions, would surely have denounced this exhibition as a denigration of humanity, and with honest, classical irony would have castigated the misuse of technology that made such cynical presentations possible—or so Hans Castorp thought, and whispered as much to his cousin.[274]

Settembrini describes the opposing sides of analysis, its advantages and disadvantages, its usefulness and when it should not be used to perceive the world. Analysis, when it is used as a 'tool of enlightenment and civilization'[275], is being used correctly, but when it 'prevents action'[276] then it injures life at it basis and does not allow its development. For Settembrini, the main concerns of a man from the West should be: analysis, reason and progress.

Settembrini is a humanist whose highest admiration is reserved for the human mind and its domain, and he explains why every science, being natural or social, is a profession of humanism, his explanation being based on the recognition that science's main concern should be with the human being. He believes that the church is a dark force opposing enlightenment, science and progress. On a micro scale, the figure of Settembrini represents progressive people in European society at the beginning of the 20th century.

About halfway through the story, Thomas Mann introduces a character, who by reasoned religious arguments is able to show religion in a perspective convincing enough to seduce Hans Castorp's way of thinking. Naphta is this radical character, and one of the examples of this religious perspective is:

> And as for the degradation of man, its history coincides exactly with the rise of the bourgeois spirit. The Renaissance, the Enlightenment, and the teachings of nineteenth- century science and economics have omitted nothing, absolutely nothing, that seemed even vaguely useful for furthering such degradation, beginning with modern astronomy -- which turned the focal point of the universe, that sublime arena where God and Satan struggled to possess the creature whom they both ardently coveted, into an unimportant little planet, and, for now at least, has put an end to man's grand position in the cosmos, upon which astrology was likewise based.[277]

According to Naphta, faith must be our medium to know the world, and the intellect is on a lower level. He does not believe in pure knowledge, nor objectivity or scientific truth. He catalogues science just like any other faith, as the most absurd realism. Concepts such as evolution, the atom, and the infinite of space and time are nothing to him:

> "Space, time and causality—in monistic terms that meant evolution. And there you had the central dogma of atheistic freethinkers and their pseudo-religion, which presumed to abolish the Book of Genesis and

---

[274] Ibid. p. 311.
[275] Ibid. p. 219.
[276] Ibid. p. 219.
[277] Ibid. p. 389.

replace it with a stultifying fable of enlightened knowledge, as if Haeckel had been present at the creation of the earth. Empiricism? The ether of space—that was exact, was it? The atom, that nice little mathematical joke, 'the smallest, invisible particle'— proved, was it? The theory of infinite space and time—that was definitely based on experience, was it? Indeed, with just a modicum of logic, one could achieve very amusing results from the dogma of infinite space and time—to wit: nothing. To wit, the insight that realism was true nihilism. And why? For the simple reason that in relation to infinity any given unit of mass approached zero. There was no size in infinity, and no duration or change in eternity, either. In infinite space, given that every distance is the mathematical equivalent to zero, there could be no two adjacent points, let alone a body, let alone movement."[278]

Naphta's vision of the world and its criticism of science is a pre-relativistic and pre-quantistic conception; in no sense does he refer to the modern developments in physics. What we show with these two characters and their vision of science is the awareness Thomas Mann had of some of the most important dilemmas of modernity. Naphta and Settembrini represent one of the dilemmas of modernity on the subject of knowledge credibility. Which is the path to knowledge: science and its rationalism, or faith and its morality?

So in *The Magic Mountain* there is the author's strong interest in science and technology, reflected in the dialogues mostly between Herr Settembrini and Naphta, and which Hans Castorp listened to carefully. In fact, on analysing each of the scientific themes in the book, it can be seen how all these themes are taking part in a re-conceptualisation. Biological sciences, medicine, physics and astronomy, all these fields of knowledge are part of the concerns of the narrative and are reflected in the discussions between the above.

On one level *The Magic Mountain* is a compendium of the known science of its time, complete with the limitations of early twentieth century science. Astronomy, biology, botany, chemistry, anatomy, physiology, physics, meteorology, and others are the subjects of private study by protagonist Hans Castorp, but more importantly they are the warp and woof of the monumental novel, elements of its structure like veins in a leaf.[279]

By the beginning of the 20th century the scope of science was being redefined and Thomas Mann portrayed this via the discussions, two of the main characters (Hans Castorp and Herr Settembrini) fully embracing the modern positivist vision where science is the knowledge of the future, capable of leading humanity to progress and well being. The other main character, Naphta, is a symbol of a past mentality that rejects the message inherent in the new science and technology for society.

Thomas Mann's stance on science, technology and their importance in the modern world, as we shall be seeing below, should be considered as not entirely positive because he realized there were a great many questions to be raised about nature and its behaviour where science was unable to provide clear answers.

One subject of this redefinition was the time-space continuum, *The Magic Mountain* presenting

---

[278] Ibid. p. 682.

[279] Greenberg Valerie D. *Literature and the Discourse of Science: The Paradigm of Thomas Mann's "The Magic Mountain"*. South Atlantic Modern Language Association. South Atlantic Review, Vol. 50, No. 1 (Jan., 1985). p. 60.

the concept of time and space as two of its main themes. When the characters of the novel arrive on the mountain, they feel a distortion in time, hours or minutes no longer measuring the duration of events and the clocks being incapable of counting the passage of time because they cannot indicate how time is measured on the mountain. They are no use at all if, arbitrarily chosen, the minimum length of time to take into consideration, according to Settembrini, is the month.

3.1.3. *Time and Space in the Mountain*

Apart from the perception of time that the characters feel, especially Hans Castorp, almost every chapter denotes a concern with a specific characteristic of time. Within the novel, the nature of time is treated in two different ways: on the one hand the narrator focuses on the personal reflections of the characters. On the other hand the omnipresent narrator is concerned with the flux or passing of time within the narrative while its events occur, and the ability of language to explain it. The characters are constantly pursuing possible ways to understand the passage of the time, to understand how they may feel time and its flux. Time is not only used as a rhetorical device, but is also part of the narrative construction of the novel. A variety of narrative strategies are adopted to deal with the concept of time:

> Mann's novel does more than just treat time as a subject of metaphysical or epistemological investigation – *Der Zauberberg* also choreographs it in the narrative. The foreword, for instance, clearly states that the retelling of the story will take seven years. This extreme period of time contrasts profoundly with the three weeks that Hans Castorp, the main character, initially intends to spend at the mountaintop sanatorium. By the end of the novel, however, his sojourn on the mountain ultimately reaches seven years, too. This synchronicity between narrative time, the duration of the narrator's retelling, and story time, the duration of the fictional story, is more than mere coincidence. It discloses a complex narrative strategy whereby the protagonist's presence overwrites the storyteller's agency. This realignment of temporalities exhibits increasing erosion of the narrative agency's structural integrity, which by the end of the novel dissolves entirely.[280]]

When Joshua Kavaloski is referring to the synchronicity of these two times, the story time and narrative time Mann used as a strategy, this is exactly where a relative time can be seen. Because if, as Kavaloski points out, by the end of the book both times have to be synchronized, then the perception of the flux of time of the main character during the narrative has to be alienated from the story time. It is in this alienation that the reader sees the relativity of time occurring in the novel.

While relating his events, the narrator describes the bases on which the concept of time and its relation to space must be considered. The flux of time may be seen only via the mutability of the atmosphere, which means that human beings can only sense the passage of time by how the natural surroundings, the space, changes. If an object moves then a change in the surroundings must be perceived, the space changes. Conversely, if an object is not moving then a change will be noticed

---

[280] Kavaloski Joshua. *The Fourth Dimension: Time in the Modernist Novel*. Charlottesville. Va. Univ., Diss. 2004. p. 41.

in the environment only if an important amount of time passes, for example a day.

> Space, as it rolls and tumbles away between him and his native soil, proves to have powers normally ascribed only to time; from hour to hour, pace brings about changes very like those time produces, yet surpassing them in certain ways. Space, like time, gives birth to forgetfulness, but those so by removing an individual from all relationships and placing him in a free and pristine state—indeed, in but a moment it can turn a pedant and philistine into something like a vagabond. Time, they say, is water from the river Lethe, but alien air is a similar drink; and if its effects are less profound, it works all the more quickly.[281]

On the mountain, 5300 feet above sea level, time suffers a change in its measurement scales, and Joachim Ziemssen is one who feels this. Just like Settembrini, Joachim is convinced of the non-fluctuation of time. In a description he provides at the very beginning of the story, three weeks of 'flatland's' time is more or less a day on the mountain. From the perspective of the characters it is conclusively proved that time suffers a dilation.

With the descriptions in the narrative of how human beings experience the flux of time, the reader is made repeatedly aware of the idea of the contraction of time. For example, someone walking a path feels that the amount of time he/she takes the first time is longer than on subsequent occasions. This happens because the first time the walker may be busy gaining recognition of the surrounding space, whereas on subsequent occasions, with the walker already knowing his/her surroundings, it will be felt that the time employed is shorter, so he/she will feel a contraction in time.

In the Berghof institution the measurement of time is revealed in various activities. Joachim liked to routinely measure his temperature because the seven minutes he spends doing it gives him a different perception of the passage of time, different from the faster or slower experience—depending on how it wants to be seen—of living on the mountain.

So how may human beings feel the passage of time? If we do nothing, we can go from one extreme to the other. That is, from thinking time is "passing" too slowly to thinking of the immensity of time, and understand it as the dissolution of time, the brain can feel itself moving from infinite time to its absence of flux.

Our sense of time can only be activated by the moments in which a person is not absorbed within a habitual environment. If a constant and repetitive action is occurring, then people to some extent lose the sense of the flux of time.

In one episode, the effect an entire hour has on fractions of hours is described, small fractions of hours being "swallowed" by longer amounts of time. One characteristic of music is its ability to awaken time, to make people conscious of the flux of time. Due to this characteristic, music can be considered a measurer of time, it can serve to quantify time. The stance the narrator takes regarding music and its ability to awaken time is different from the conception of music predominant in the

---

[281] Mann T. *The Magic Mountain. op. cit.* p. 4, note 258.

romantic period, when it was felt that music was able to abstract people from the flux of time.

The time of the story in which the events take place is one, a linear flux of time. However, the time the characters feel could pass in accordance with other experiences[282]. For the narrator, the length of time Hans Castorp and the other characters felt is relative to the feelings they are experiencing in the various situations:

> Narrative, however, has two kinds of time: first, its own real time, which like musical time defines its movement and presentation; and second, the time of its contents, which has a perspective quality that can vary widely, from a story in which the narrative's imaginary time is almost, or indeed totally coincident with its musical time, to one in which it stretches out over light-years. A musical piece entitled "Five Minute Waltz" last five minutes—this and only this defines its relationship to time. A story whose contents involved a time span of five minutes, however, could, by means of an extraordinary scrupulosity in filling up those five minutes, last a thousand times as long—and still remain short on boredom, although in relationship to its imaginary time it would be very long in telling. On the other hand, it is possible for a narrative's content-time to exceed its own duration immeasurably.[283]

This experience of time was being recognized in the same period by several modernists' authors. Mann's words can be translated into the experimental novels of the authors we have examined, James Joyce and Virginia Woolf, where fundamental concepts of time such as simultaneity were treated in their narratives, and show the various time experiences that Mann mentions. The novels of Joyce and Woolf, in Mann's definition which follows, become "time novels". The subject of their stories is time and its flux:

> A narrative, then, can set to work and deal with time in much the same way as those depraved dreams. But since it can "deal" with time, it is clear that time, which is the element of the narrative, can also become its subject; and although it could be going too far to say that one can "narrate time," it is apparently not such an absurd notion to want to narrate about time—so that a term like "time novel" may well take on an oddly dreamlike double meaning. And indeed we posed the question about whether one could narrate time precisely in order to say that we actually have something like that in mind with this ongoing story. And in touching upon the wider question if whether those gathered around us were quite clear about how long it had actually been since the now-deceased, honor-loving Joachim wove those comments about time and music into a conversation…[284]

In the 'depraved dreams' the narrator is referring to, time cannot be counted or even measured, it is not an aspect or constituent of the actions taking place, so the same phenomenon is the one proposed by the narrator that can be experimented within narrative. What if narrative relates experiences where the flux of time cannot be recognized? This is exactly what Hans Castorp is experiencing up in the mountain, as if he is in a dream where time is not passing, is not in flux.

---

[282] Apart from these two times already mentioned by the narrator there is also the time the reader takes to read the story. This time is separate from narrative and is a time which by its nature, depends completely upon the reader's abilities. While reading *The Magic Mountain,* due to these three different times, of the narrative, the story, and the reader, we can understand that the time is running in a triple relative helix. The reader will be the principal receptor of this feeling of the relativity of time. And even though in certain moments of the story the three different times collapse into one, this will just emphasise the reader's feeling when the three different times will split.

[283] Mann T. *The Magic Mountain. op. cit.* pp. 531-532, note 258.
[284] Ibid. p. 532.

Mann is able to evoke phenomena taken from the life experience of any person, and show their relation to the nature of time. He represents the non-fluctuation of time in several scenes set in the sanatorium, for example by showing every day to be just the same, the narrator creating a monotony where any spatial change is noticed. As has been seen, for the narrator the flux of time can only be acknowledged if supported by spatial changes. So if no spatial change can be perceived within the sanatorium, then the flux of time cannot be experienced.

In the section 'Snow' of chapter 6, Mann recreates an atmosphere of the absence of time or its infinite characteristic. The protagonist Castorp has decided to buy skis and go on a long expedition. After three o'clock in the afternoon he left the Berghof sanatorium with the idea of returning a few hours later. However, after skiing for a while he found himself in the middle of a snowstorm that covered the entire landscape, and even his own body. Here no direction and no time could be experienced, the landscape, as a constant, does not allow us to have any idea of the spatial condition of the hero and his temporal location.

> Hans Castorp was making progress nonetheless—or rather, he was moving. But whether it was purposeful movement, movement in the right direction, or whether it might not be have been better to stay where he was (which, however, did not seem feasible), that remained to be seen. Even theoretically, chances were against it; and from a practical point of view, Hans Castorp soon came to believe that there was something not right about the ground under his feet, that it was somehow not what it should be, by which he meant the gentle slope that he had regained only after an exhausting climb back up the ravine and that needed to be retraversed.[285]

With the recreation of this environment Mann is applying his above cited analysis of time and its relationship to the narrated events. Castorp was unable to feel any of his body parts, nor any particular characteristics of his surroundings. He was confused.

Throughout the novel Mann constantly reminds us how people belong to their epoch, and how various disciplines attempt to solve the problems of an epoch. Time, its relation to space, our inability to find its borders and their paradoxical infiniteness, were basic problems from the 1910's onwards. According to logical mathematics, what does infinity mean? Our primary concepts such as distance, motion and change contradict infinity, so how can we deal with this?

In 'Snow', Hans Castorp is faced with the idea of infinite space[286]. Everything surrounding him was white, there was no recognisable surface or object, so his vision was taken up entirely with an unspecified form, a landscape without characteristics, all that could be seen was whiteness, so in this situation he came to be confronted with the idea of infinity, the immense amount of snow represents infinity. Throughout his life, the ocean as an actual representation of eternity fascinated Thomas Mann. In this episode, the snow comes to be the symbol of eternity, just like an eternal

---

[285] Ibid. p. 474.
[286] In 1920 *Women in Love* was published, with D.H. Lawrence also confronting the problem of infinity.

ocean.

According to the narrator's definition people can only feel time when departing from their spatial conditions, the spatial change of these conditions. If there is a space without defined objects, and the day and night or the change of seasons cannot be identified, the flux of time cannot be recognised. Hans Castorp in this precise moment is immersed in a situation where timelessness could be felt as well as shapeless space.

When he finally gets out of the situation in which he is immersed by arriving at a safe place, a shed or hut, he thinks that he has been there for hours, although according to his gold watch this is not the case:

> It must be evening by now, close to six—to think of all the time I've wasted passing on. Just how late is it, really?" And so he looked at his watch—although it wasn't easy to fish it out of his clothes with fingers so numb that they couldn't feel anything—at his gold watch with the monogrammed spring case, which was still doing lively, faithful duty here in this lonely wasteland, just as was his heart, his touching human heart tucked inside the organic warmth of his cage.

> It was half past four. What the devil—it had been almost that late when the storm had first broken. Was he supposed to believe that his confused wandering had lasted barely one quarter of an hour? "Time has slowed down for me," he thought. "Passing on is boring, it seems. But it will be fully dark by five or five-thirty, that much is certain. Will it stop before then, stop in time to keep me from passing on even more?...[287]

When Castorp returns to his thoughts, he starts a discussion with himself on the concept of position and its relationship to space. From this part of the book the importance of this subject to the author, that is, his recent experiences in the snow and recognition of spatiality (or how impossible it is to recognise), can be inferred.

Taking a break and drinking some port, Castorp falls sleep. The next ten pages of the narration make up part of Castorp's thoughts and dreams, and when he finally wakes up he realizes that only ten minutes have passed. This again is the collapse of time:

> He managed to pull out his watch. It was ticking. It had not stopped the way it did if he forgot to wind it of an evening. It wasn't five yet—not by a long shot. Not for another twelve, thirteen minutes. Amazing! How could it be that he had lain there in the snow for only ten minutes or a little longer, had fantasized all those daredevil thoughts, those images of happiness and horror, while the hexagonal monster moved on as quickly as it had come? Well, then, he had been remarkably lucky in terms of getting home.[288]

In *The Magic Mountain* this is the first direct confrontation of time in its pure form, with Hans Castorp. Before it, the characters only spoke about time in their interpersonal conversations. This is the first time one of the characters vividly experiences the collapse of time in the mountain.

Chapter 7 is of primary importance for the treatment of temporality. This is because in a section of the chapter time is narrated as itself, as the subject of the narrative. In some English translations, the title of the first section of this chapter has been translated as "By the ocean of time" and in

---

[287] Mann T. *The Magic Mountain*. *op cit.* pp. 478-479, note 258.
[288] Ibid. p. 488.

others as "A stroll by the shore". In this chapter there is a wide ranging description of the perception of time, the main feature of many human activities, such as music, narration and even the life force itself. It is attached to them inextricably, it cannot be separated off to explain them.

> Time is the *element* of narration, just as it is the element of life—is inextricably bound up with it, as bodies are in space. It is also the element of music, which itself measures and divides time, making it suddenly diverting and precious; and related to music, as we have noted, is the story, which also can only present itself in successive events, as movement toward an end (and not as something suddenly, brilliantly present, like a work of visual art, which is pure body bound to time), and even if it would try to be totally here in each moment, would still need time for its presentation.[289]

There is an effect on narrative which Mann develops in this chapter, where he speaks about two different kinds of times within narrative; the first concerns the duration of the actions taking place, whereas the second refers to how people feels the fluency of time while these actions are happening. One of the results this second narration can lead to is the narration *about time*. Mann also speaks about the concepts of "still" and "again" which are defined by states of consciousness. "Time drowns in the unmeasured monotony of space. Where uniformity reigns, movement from point to point is no longer movement; and where movement is no longer movement, there is no time"[290]. For the narrator, space is an entity with measurable symmetries, and when a uniformity of movement is achieved, then time collapses and its fluency ceases. " …– time, a line composed of elastic turning points…"[291]. The 'elastic turning points' the narrator refers to not only depend on the movement taking place within space, but on the feelings of the characters. The elasticity of time mentioned here has to do with how people experience the passage of time, which for the narrator mostly depends on the emotions the characters feel when faced with a specific set of circumstances.

For the narrator, there is no direct definition of the concept of time. However, there is one way to define it, although, as Joshua Kavaloski points out, Mann's definition is redundant:

> The only thing resembling a premise arises with the cryptic and somewhat tautological statement that "Die Zeit…zeitigt…Veränderungen," which could be translated as "time temporalizes changes." This phrase recurs six more times throughout the rest of the novel, so that it qualifies as a leitmotif. Time, it seems, is synonymous with change, with moment, with action, and indeed, with the very force of life itself. It is this incorporeal dimension in which dynamism takes place.[292]

The way in which Mann narrates time and the ideas behind the concept of time he is using, go in parallel with the concept of time conceived within many of the fields of knowledge of the epoch, for example philosophy and science, and the ones expressed by Henri Bergson with his conception of 'dureé', and Albert Einstein and the 'Relativity Principle'. As well as these two thinkers, behind the conception of time in Mann's book there is also the figure of Oswald Spengler. Their ideas will

---

[289] Ibid. p. 531.
[290] Ibid. p. 537.
[291] Ibid. p. 697.
[292] Kavaloski J. *op cit* p. 71, note 280.

be used in the following section to illustrate the position of the relativity of time in *The Magic Mountain*.

The concept of time in Mann's novel is not narrated exactly in the way the concept of time is used in the theory of relativity, or in Bergson's philosophy. However, what can be seen is a shared symbol behind these concepts, a symbol of a ***relative time*** for different situations, a symbol of the culture as Spengler called it. More recently, as can be seen from the general introduction, this symbol could be taken as a "quasi-object", an idea born in the theoretical framework, and then introduced to society. Or as a concept, which is between "fields", and has contact with various areas of study.

Oswald Spengler reflected the cultural environment of Germany before the First World War, and the idea of a relative time as a European cultural symbol is one of the ideas he wrote about. Like Einstein and Bergson, Mann spoke about the passage of relative time through space, and the three of them lived in a culture that had begun to perceive time as relative. This concept of a relative time, like that of simultaneity, was a cultural one. Both were adopted by European culture, and the physicists, philosophers and writers of the period grasped at its interpretations.

The analysis of *The Magic Mountain* will end with some of Mann's ideas as expressed in the book relating to society and science, the latter in the process of becoming one of most effective tools for the explanation of the surrounding world; and Mann, like Hans Castorp, was involved in the transition from an era of pseudo-science to an era when modern scientific methods were accepted as the high road to knowledge.

3.1.4. *Mann's Social and Scientific Ideas in* The Magic Mountain

Thomas Mann was convinced that social interaction is fundamental to what a human being is capable of thinking; we are not individuals but rather a collective soul. For Mann our social surroundings is a determining factor in our conception of life and of what the human body is.

> All sorts of personal goals, purposes, hopes, prospects may float before the eyes of a given individual, from which he may then glean the impulse for exerting himself for the great deeds; if the impersonal world around him, however, if the times themselves, despite all their hustle and bustle, provide him with neither hopes nor prospects, if they secretly supply him with evidence that things are in fact hopeless, without prospect or remedy, if the times respond with hollow silence to every conscious or subconscious question, however it may be posed, about the ultimate, unequivocal meaning of all exertions and deeds that are more than exclusively personal—then it is almost inevitable, particularly if the person involved is a more honest sort, that the situation will have a crippling effect, which, following moral and spiritual paths, may even spread to that individual's physical and organic life.[293]

The characteristics of an epoch and the society in which people find themselves have such an impact on a person that they are even able to dictate his or her own organism's health.

---

[293] Mann T. *The Magic Mountain. op cit.* p. 31, note 258.

Thomas Mann is confident that science does provide a true knowledge of the world, although in this period it was hard to discriminate between what was science and what was not. In Mann's worldview, physics and chemistry may provide explanations for life's events; yet we find passages where he is giving the name of science to things that nowadays would be dismissed as unacceptable. Even though Mann expressed confidence in science, he was not quite as confident as Settembrini, but he did think that only justice, science and reason would achieve what he called "the republic of the world"[294], a way to understand the progress of humanity and its organisation.

One example in Mann's book that perfectly represents the phenomenon of the beliefs society held on the technological improvements of the epoch is the X-rays room at the sanatorium. This room was a place where Hans Castorp went, and could not work out how it functioned.

> He was so numbed by what he had just left behind, by the adventures of the last ten minutes, that he was unable immediately to realign his inner world as he crossed the threshold into the X-ray room…

> He now saw Director Behrens standing in front of a cupboard or built-in cabinet, his back to them as they entered; he was inspecting a blackish plate that he held out at arm's length against the dull light of the ceiling lamp. They passed him as they moved deeper into the room, and were themselves passed by the assistant, who was busy getting things ready for the procedure. There was a peculiar odor here—a kind if stale ozone smell in the air. The built-in unit jutted out between the two black-curtained windows, dividing the laboratory into unequal parts. You could make out clinical apparatus of various sorts: glassware, switch boxes, and tall vertical gauges, but also a camera-like box on a rolling stand and rows of glass photographic plates set along the walls. You couldn't tell if you were in a photographer's studio, a darkroom, or an inventor's workshop and sorcerer's laboratory.[295]

This is a typical characteristic of the epoch's science, black boxes telling nothing about the procedure that has been (or will be) followed. Hans Castorp was trusting his prospects of health to this black-box, and he was not sure if it was the right thing to do, because he did not even feel ill. But the result of the X-rays, which can be taken as an experiment that went according to theory, proved that Hans Castorp, after being subjected to the machine, had a health problem.

Some of the conversations Hans Castorp had with doctor Behrens reveal the interest Thomas Mann had in medical science and its progress. On one occasion, Hans asked the doctor to tell him about the body's skin, and for some pages the doctor gives very medical explanations of some of the processes human skin undergoes:

> That is a little contrivance of the sebaceous glands, which secrete the fatty, albuminous substance that oils your skin and keeps it supple, and pleasant to feel. Not very appetizing, maybe, but without it the skin would be all withered and cracked. Without the cholesterin, it is hard to imagine touching the human skin at all. These sebaceous glands have little erector-muscles that act upon them, and when they do so, then you are like the lad when the princess poured the pail of minnows over him.[296]

---

[294] Ibid. p. 154.

[295] Ibid. p. 211.

[296] Mann Thomas. *The Magic Mountain*. Translated from the German by H.T. Lowe-Porter. Secker and Warburg London, 1965. p. 264.

Mann was well informed about tuberculosis, its symptoms and the way it was treated. His wife was sick with this disease, or at least that was what the Mann family thought, so he acquired a lot of information about it. However, this last episode about the X-ray room implies strong criticism of the way in which science and technology were developing because, as Castorp saw it, there was no difference between this room and a "sorcerer's laboratory".

In *The Magic Mountain* scientific terms are used to explain the effects of substances inside our body, e.g. those in small proportions having certain healing effects, and in greater proportions having deadly effects. Along the same lines of categorization, and to decide what was and what was not science, we have the studies developed by Dr. Krokowski in the sanatorium, the "Telekinetic" phenomena, on the movement of objects with the mind. Materialization, the name given by science to these events, was Dr. Krokowski's main purpose in his study of Ellen Brand, a sanatorium patient.

The last chapters see the arrival of a gramophone at the institute. As Mann tells it, the gramophone was a piece of magic, another black box, this time able to reproduce the sound of singing voices. Mann's description of where the disks were left was of "mute books laden with hidden magic"[297]. Mann is able to reflect the feelings of uncertainty the society of this epoch entertained towards the new technological developments.

3.1.5. *The Making of* The Magic Mountain

In 1912 Thomas Mann's wife was for a short period secluded in the sanatorium of Davos due to health problems having to do with her lungs. In the summer of that year Mann went to visit his wife, and from then on began to think of writing about her analysis and seclusion. He had just completed *Death in Venice* and wanted to write a different kind of work.

In this period Thomas Mann was immersed in an intellectual mid-life crisis and *The Magic Mountain* came to signify his chance to explore certain topics that he had not yet dealt with. After *Death in Venice* and the creation of its main character Gustav von Aschenbach, themes and narrative techniques that he could not explore in that story awaited development in the creation of Hans Castorp's character and his story at the Berghof Sanatorium. Castorp himself, bourgeois, blond, and young, was practically the opposite of Mann's previous central character.

It took more than a decade to develop *The Magic Mountain*, conceived before the war as a shorter story, and then undergoing reconsideration of some of the topics Mann wanted to deal with, especially those relating to human behaviour. The main reason for his modifications dates from the

---

[297]Ibid. p. 628.

outbreak of the Great War in the autumn of 1914. The first chapters had been written from July 1913 until the beginning of the war.

By the beginning of 1915, Mann had begun to speak of his most recent work as a 'novel', intended to frame a more complex story and to deal with themes that had nothing to do with his previous thinking about writing a novel as a counterpart to *Death in Venice*.

The spring of 1915 was the most important period for the development of the first sections of *The Magic Mountain*. By autumn of that year Thomas Mann had already written the first chapters, as far as the 'Hippie' section, the last to be written before the subsequent pause of four years. In 1915 the sections were being publicly read and although Mann was eager to continue the development of the narrative, the profound commitment that he felt towards his nation and society obliged him to start working on his *Reflections of an Unpolitical Man,* where he defended German social values just while the First World War was taking place, and where his positions on war, Germany and modernity were outlined. By October of that year he had stopped writing *The Magic Mountain*.

To understand why someone like Mann supported certain ideas while his country was at war is still an issue that deeply interests his biographers. The main question is why, before the beginning of the war, he supported one set of positions, then after war broke out began to argue for their opposite, and after the war was over, returned to his earlier position. His biographer Hermann Kurzke gives an answer.

> So, what reason does a writer like Thomas Mann have," asks Wilhelm Herzog, upset and irritated in December 1914, what reason does the author of *Buddenbrooks* have "to express thoughts in wartime that during peacetime at least he always suppressed?" What reason had a decadent with cultivated manners to describe something so uncivilized as war as something holy, and to be enthused about purification and liberation? In some regards that is the question of all questions. Mann's behavior at the outbreak of war belongs to the great riddles a biography must solve. Generally it appears as a mistake that then is corrected with the change to a republic, as a kind of slip. There is offered only an explanation that at the time, the great majority welcomed the war and Mann joined that majority.[298]

Thomas Mann finished the *Reflections of a Nonpolitical Man* in March 1918, following it with *A Man and His Dog*, finished by October 1918, and then with "Song of the Child", which appeared in April 1919. It was not until the beginning of 1919 that Mann began to reconsider the manuscript he had set aside, and by April 20 of that year he had recommenced preparations for its completion, with a period for reviewing the entire material from the very beginning.

This new stage reflected some of his thoughts of the previous few years, as his *Reflections* clearly show. However, the new political position that Mann had developed brought little change to the principal themes of *The Magic Mountain* such as the crisis of the protagonist, the theme of love

---

[298] Kurzke H. *op cit*. p 217, note 259.

and disease, and the political dialogues where liberal and conservative positions are debated, except in the way he was addressing these themes. Mann was in pursuit of a balance, of a degree of tolerance among the main forces that could direct the progress of a nation. By the end of 1921, the author had already completed almost two thirds of the novel.

The *Reflections* helped Mann to clarify the essential, most basic ideas he wanted to deal with in the dialogues of his new characters. *Reflections* provided an inner structure of the thought for *The Magic Mountain* without overloading it with political ideas. With this clarity of thought, Mann was able to construct the personalities of his characters Settembrini and Naphta who were engaged in political theorising, giving them precise positions on modern civilisation and the aspirations the Western world should have.

The *Reflections*, apart from the structure leading the reader to some of the author's ideas and the political framework it provided him with, contained ideas on democracy as well as of a reactionary tendency, neither entirely acceptable to the public. In the end these ideas came to be reflected in *The Magic Mountain*.

> Although there are reviews that ascribe a democratic tendency to the novel, it is very clear that it concerns a democracy in the sense of the *Reflections of a Nonpolitical Man*: "Democracy…comes from above, not from below." Thomas Mann's political dream is the model of a nation of enlightened absolutism. A union of power and intellects must be at the top; then everything can be orderly. That he criticized the existing empire and did not like Wilhelm II, cannot overlook the fact that this state corresponded essentially to his political and economic ideas.[299]

The personality of Settembrini was settled on as a contraposition to the dogmatic and totalitarian figure of a Jesuit, Leo Naphta. Naphta's vision of the world is permeated with the one dominant in the Christian Middle Ages, with science and progress definitely the wrong road for humanity to follow. The vision of Settembrini is that of a humanist, confident in the spirit of humanity and its ability to build a new world based on respect and dialogue, where science and technology play a fundamental role to underpin a better life. These two characters are the embodiment of a tension constantly present in society by the beginning of the twentieth century.

While Hans Castorp was in the sanatorium he had the opportunity to take part in the long conversations between Settembrini and Naphta, both of whom were strongly committed to their ideologies and repeatedly aired them. Among the main questions addressed were: was it possible to construct a humane government allowing freedom in mass society? Was it possible that this government could control the whole of society without using any kind of force or shall we need to go back to the totalitarianism of the past? Democracy, Enlightenment and Liberalism, will these concepts become part of modern society, or simply be an unattainable ideal that cannot come about due to the cruelty and selfishness of human nature?

---

[299] Ibid. p.174.

What can be known about how Thomas Mann developed *The Magic Mountain* depends on the diaries he left, running from September 1918 to December 1921. He tended not to leave any trace of his correspondence; a couple of times he burnt it, leaving scholars without a vital means to gain insight into his thoughts and his method of developing his texts. More information on this can be found in T.J. Reed's essay 'Mann as a Diarist'[300].

Nevertheless, his later life is better documented because in his last years he decided not to destroy his correspondence again, so the diaries and correspondence from the 1930's to the 1950's can be used as a data resource, although it had been sealed in 1952, and only opened two decades later:

> In 1896 he burnt the records he had made up to then, only to begin again at once; and in 1944-5 he burnt nearly all the pre- 1933 diaries. In 1959, he wondered whether to burn what he had written since 1933. The issue was his homosexuality, the secret of which he had guarded by previous burnings but had then gone on writing about, often in nostalgic reference back to the feelings of earlier days. Should he now dispose of this evidence too, or should he make it the means of belatedly coming out? He finally decided against destruction, and in 1952 packaged and sealed his notebooks down to the preceding year, inscribing in the cover, in English: 'Daily notes 1933-1951 without literary value and not to be opened before twenty years after my death' (see diary, 5 June 1952).[301]

The explanation of why the diaries from 1918 until 1921 were preserved and not burned in 1944 or 1945 is because they served him for the writing at that time of *Doctor Faust*. Later on, when the boxes containing Mann's last bibliographical information were opened, the diaries of this period were found.

The writing of the novel suffered constant interruptions from his travels as well as the writing of essays such as "Goethe and Tolstoy"(1921) and "An Experience in the Occult" (1923). He finished the novel by September 1924 and immediately afterwards, by November of the same year, it was already in the bookshops, and there was an outstanding response. *The Magic Mountain* quickly surpassed the fame of *Death in Venice*, and Thomas Mann came to be internationally known.

3.2. *Mann's Idea of Time: Spengler, Bergson and Einstein*

3.2.1. The Decline of the West *and* The Magic Mountain*: Oswald Spengler's interaction with Mann's ideas*

Fifty years of Thomas Mann Studies [302] tries to cover Mann's novels, essays, articles and interviews, but we can find just one reference to an article referring to the work of Oswald Spengler. Nonetheless, this article is crucial to our understanding of Mann's most important

---

[300] Reed T.J. *Mann as Diarist*. In *The Cambridge Companion to Thomas Mann*. Edited by Ritchie Robertson. Cambridge: Cambridge University Press. 2002.
[301] Redd T. *op cit*. p. 226. note 300.
[302] Jonas Klaus W. *Fifty Years of Thomas Mann Studies*. Minneapolis. The Jones Press. 1955.

approach to *The Decline of the West* and Spengler's ideas in general.

When it first appeared towards the end of the First World War *The Decline of the West* was recognised as of prime importance for German culture. The first volume did not last long in the bookshops, and when the second appeared in 1922, the same thing happened. Of this first edition, seventy thousand copies were sold.

Thomas Mann first wrote on Spengler's ideas in 1922, a contribution to the American magazine *The Dial* in November-December of that year, 'Brief aus Deutschland' (Letters from Germany). In this essay he referred to a new species of book, which he called an intellectual novel, and within this new wave of literature, he placed Spengler's book, among others. The books he referred to were not the kind of traditional novel as established at the beginning of the century. Among them were Nietzsche's *An Attempt at a Mythology* and Friedrich Gundolf's biography of Goethe, but the article was mainly an analysis of Spengler's.

> I have the great work of Mr. Oswald Spengler in mind, this two-volume behemoth, whose catastrophic title ("The Decline of the West) that the American public has certainly already heard of, because of the great commotion his appearance caused among us, so strong it even crossed the ocean.[303]

In 1924 the essay "Über die Lehre Spenglers" was published in Germany, almost entirely a re-edition of 'Brief aus Deutschland'. In both articles Mann spoke of Spengler as a "fatalist" and a "defeatist": 'Spengler denies being a pessimist…He is a fatalist.'[304]

This position of Mann, against Spengler, was radically different from that of the past, because there is some common ground in *The Decline of the West* and Mann's essays such as "Gedanken in Kriege" (1914) and "Betrachtungen eines Unpolitischen" (between 1915 and 1918). For example, they share certain attitudes towards culture in general and have similar ideas about Nietzsche's work. However, there seems to be no direct connection between the two authors in the years 1914 to 1918, no record in this period that Mann read Spengler nor that Spengler read Mann. Perhaps one of the main reasons leading Mann to change his opinion on the ideas he had shared with Spengler was the war, and the thoughts it left him with.

> To read Mann's wartime essay [the Betrachtungen] at the same time as Spengler's history makes us conscious of the deeply human struggle at the heart of Mann's work.[305]

From Mann's 1918-1921 diaries, published in 1979, we know that Mann read Spengler between

---

[303] My translation. The original text runs: 'Ich habe das große Werk des Herrn Oswald Spengler im Sinn, diesen zweibändigen Koloβ, dessen kraβ katastrophaler Titel („Der Untergang des Abendlandes") gewiβ auch dem amerikanischen Publikum schon zu Ohren gekommen ist, da der Lärm, den sein Erscheinen bei uns hervorgebracht, stark genug war, um selbst über den Ozean zu dringen'. Mann Thomas. *Aufsatze Reden Essays*. Band 3 1919-1925. Aufbau-Verlag. 1986. p. 287.

[304] My translation. The original text says: 'Spengler Leugnet, Pessimist zu sein. Einen Optimisten wird er sich noch weniger neneen woollen [?]. Er ist Fatalist.' Mann Thomas. *Aufsatze Reden Essays. op cit*. p. 439. note 303.

[305] Nicholls Roger A. *Thomas Mann and Spengler*. In *The German Quarterly*, Vol. 58, No 3 (Summer, 1985), pp. 361-374. Blackwell Publishing on behalf of the American Association of Teachers of German.

May 12, 1919, when he wrote 'I am not yet acquainted with Spengler [The Decline of the West], but have put him down on my reading list'[306], and July 2 1919 when he had already read Spengler's book and recorded the impression it had made on him, as great as when he had first read Schopenhauer twenty years before. By July 5, 1919 Mann was sharing some of Spengler's thoughts:

> One must take a contemplative, even resignedly cheerful view, read Spengler and understand that the victory of England and America seals and completes the civilizing, rationalizing, pragmatizing of the West which is the fate of every aging culture. More and more I see this was (insofar as it was not social revolution from the start; that is the other side of the matter) as a vast quixotism, a last mighty effort to rear up and strike a blow on…before collapsing with a rattle of bones.[307]

In Roger A. Nicholls' article *Thomas Mann and Spengler*, the author writes of some of what they had in common: the difference between culture and civilization, Goethe and Nietzsche as major authors of the past, their perspectives on Russia, and their work during the war. Nicholls says:

> What Thomas Mann must have appreciated in Spengler was the broad perspective in which Spengler saw the cultural struggles in which Mann himself was so desperately involved.[308]

Mann, like Spengler, considered history not as composed of isolated political, social or economic entities, but as a more unified entity in which the entire community participated. The connections between Mann and Spengler can be noticed in the way both authors consider the history of German culture from the end of the nineteenth century. For example, the debates between Settembrini and Naphta reflect quite closely some of Spengler's ideas on the transition from a past culture to a more recent one, and Mann scholars tend to stress other affinities of his thinking with Spengler's, both of them sharing ideas about the isolated cultures that could grow with particular conceptual backgrounds:

> But Mann does "grow" Hans Castorp in the controlled environment of the Berghof, whose parameters are the distilled influences of Europe before the First World War. Spengler also thought of civilizations as essentially isolated "hermetic cultures developing within their own parameters.[309]

One of the most valuable ideas common to Spengler and Mann is their idea of time, both wanting to achieve a recognition of time as a cultural entity; this was of major importance for both authors.

> It is not surprising then that Mann read Spengler …He read [Spengler] also when he was very much involved with his own work in progress. Thus on June 26, 1919 he talks of the role that the "Zeitproblem" plays in Spengler and associates it both with the "Taufschale" scene in *Der Zauberberg* and the problem

---

[306] Mann Thomas. *Letters of Thomas Mann: 1889-1955*. Selected and translated by Richard and Clara Winston. Knopf, New York 1971. p. 95.

[307] Mann Thomas. *Letters of Thomas Mann: 1889-1955*. *op cit.* p. 97, note 306.

[308] Nicholls R, *op. cit.* p. 368, note 305.

[309] Prusok Rudi. *Science in Mann's Zauberberg: The Concept of Space*. Modern Language Association. Vol. 88, No. 1 (Jan. 1973). p. 52.

of time as a basic motive of the novel.[310]

This conception of the future, the waiting for an event to happen, is crucial for an understanding of the role that time plays with Mann's novel. The contraction of time in *The Magic Mountain* has to do directly with the perception of time that Western culture was starting to conceive. Hans Castorp and all the characters of the novel were waiting -without knowing it, only the author could - for the arrival of the war. The relativistic perception of time built by Mann in his novel is related to the amount of time spent waiting, which was apparently endless for the unhealthy people at the Berghof. Kern's chapter on "Direction" recognizes Castorp feelings.

> After several years at the Berghof, Hans Castorp began to give himself so fully to the timelessness... He [Settembrini] warns Hans not to succumb to the prodigious wastefulness of the Asiatic world that comes from having an abundance of space.[311]

This waiting is related to the feeling of dilation felt by the characters of the novel, and is developed by Mann in the course of the entire novel. Here the conception of infinite space and relative time are joined in one unified concept, which reflects the idea that the culture of the epoch had of the concept of space and time, Spengler's "prime symbols".

The culture of time and space developed in Germany from the beginning of the century is crucial to understand this common pursuit of writers such as Mann and Spengler, but also of physicists such as Einstein. Stephen Kern, in *The Culture of Space and Time 1880-1918*[312], manages to show how the culture conceived a new perception on time and space due to technological innovations such as the automobile, X-rays, the cinema, telephone, etc. These technological developments established a new way of thinking about these two concepts. In his chapter "The Future", Kern speaks about Mann and Spengler's books.

> Both *The Decline of the West* and *The Magic Mountain* were conceived before the war, worked on during it, and published after. They spanned the period and sought to identify what it signified… And, as we would expect in a retrospective view of an age leading up to war, they were portrayed waiting for it to happen."[313]

It is true that both books were published after the Great War, but the first part of Spengler's book was published about the time the war was ending, and the second part in 1922, whereas Mann's book was published six years after the first edition of Spengler's *Decline*. From Mann's relationship to Spengler's book, it can be seen that the idea of a relative time, as well as an infinite space, were fully represented in the isolation of the people at the Berghof institution up there in the mountain, where that specific environment created changes in the conception of time and the duration of

---

[310] Prusok R. *op cit*. p. 370, note 309.

[311] Stephen Kern, *The Culture of Time and Space 1880 – 1918.* Cambridge, Massachusetts. Harvard University Press. 1983. p. 255.

[312] Stephen K. *The Culture of Time and Space 1880 – 1918. op cit,* note 311.

[313] Ibid. p.106.

events.

3.2.2. *Le Durée and* The Magic Mountain

Thomas Mann considered two different kinds of time in his novel: on the one hand the time when the story is taking place and on the other hand, the time that the characters sense. From this distinction a strong affinity can be recognized with the conception of time that the French philosopher Henri Bergson described in *Time and Free Will: An Essay on the Immediate Data of Consciousness.* The concept of 'durée' was introduced in his doctoral thesis, published in the year 1889.

For Bergson abstract time is the one used for practical purposes, for the organisation within a society where objects such as clocks can quantify it, whereas "real" time cannot be measured. Bergson denotes the concept of "real" time as the duration or 'durée' of an event. This duration is perceived by our consciousness and is not a quantifiable entity, so cannot be measured.

The first time that Hans Castorp has serious doubts about the characteristics of an entity such as time is when he is with his cousin Joachim, who is measuring his temperature and has a thermometer in his mouth; he asks how long they will have to wait, and Joachim 'raised seven fingers'. Castorp replied that by that time, seven minutes should have passed, but Joachim did not see it that way. The answer that Castorp obtained later is useful for the comparison of Bergson's time and Mann's:

> Joachim shook his head. After a while he took the thermometer out of his mouth, looked at it, and said, "Yes, when you pay close attention to it—time, I mean—it goes very slowly. I truly like measuring my temperature four times a day, because it makes you notice what one minute, or even seven, actually means—especially since the seven days of a week hang so dreadfully heavy on your hands here."[314]

With this action Joachim is moving from "abstract" time to "real" time. A week is a long time, but it cannot easily be measured, so a thermometer is an excuse to count time, to come back to 'abstract' time because the social world of the Berghof was one where abstract time did not count, time was not being measured, there was no point in doing it.

After Joachim's reply, Castorp starts to elaborate a theory about the meaning of the passage of time and its relationship to space. He says that when a moment is short or long cannot be determined without practical devices. He arrives at the conclusion that time has to be measured by how fast the space can be passed through; the velocity of an object is fundamental for the measurement of time within space. Castorp is recognizing the Newtonian tradition on the relationship of "abstract" time and space.

However, on the subject of "real" time Castorp concludes that the causes of subjective feelings

---

[314] Mann Thomas. *The Magic Mountain. op cit* p. 63, note 258.

relating to lengths of time have to do on the one hand with the monotony or emptiness of the circumstances, or on the other with the inherent richness or interest of the moments.

> Emptiness and monotony may stretch a moment or even an hour and make it "boring," but they can likewise abbreviate and dissolve large, indeed the largest units of time, until they seem nothing at all. Conversely, rich and interesting events are capable of feeling time, until hours, even days, are shortened and speed past on wings; whereas on a larger scale, interest lends the passage of time breadth, solidity, and weight, so that years rich in events pass much more slowly than do paltry, bare, featherweight years that are blown before the wind and are gone.[315]

This is how time in *The Magic Mountain* is conceived. Indeed, the structure of the book is also conceived and depends on the way the characters feel time. When Hans Castorp arrives on the mountain he thinks of the days as in the 'flatland'; for him time passes just as it did before his arrival. However, as the narration of events moves on the reader may realize that the number of the pages (the material length of the sections), and the measurement of time—of the 'abstract' time of the story—are not directly related. In fact the opposite happens, 'abstract' time and the number of the book's pages are related in an indirect sense. The more time is passing on the mountain, the fewer pages are devoted to narrating it.

On to the topic of the indirect relationship between the amount of time and the number of pages, the book is divided into four sections. The first chapter narrates the arrival of the hero at the Berghof institution, where only a few hours are narrated. The second chapter is a vivid incomplete biography of the hero narrating the reasons why he had arrived at the sanatorium. Here two events of his life are mentioned, first that his parents are dead, and his mother's uncle, Consul Tieneppel, had brought him up, and second, that Castorp had been unable to cope with the exams he had had to take to become an engineer. The second chapter does not belong to the timeline of the story, but the third chapter finishes recounting his first day at the Berghof Sanatorium. In this first part Hans Castorp feels the actions that are taking place on individual days more vividly.

The first four chapters narrate the first 21 days of the hero on the mountain and 179 pages are taken up with it. In the fifth chapter there are still some events that keep the hero in some ways interested in the new place and the lives of the people living there. He comes to be part of the institution and not just a visitor, six months pass and 157 pages are taken up with them.

Then the hero starts to feel the dilation of the passage of time, due to the routine structure of events and the absence of ways for the people of the institution to distract themselves, so two years pass in another 192 pages. At the beginning of this part, which starts in chapter 6, Hans Castorp wonders at length about the nature of time, and it becomes a crucial part of the book, allowing space for reflection on several of its main themes.

Finally in the fourth part, in the last chapter only 175 pages are devoted to the narration of the

---

[315] Ibid. p.102.

four last years Hans Castorp stayed on the mountain. These last years Castorp was completely immersed in the atmosphere of the mountain and he was no longer able to recognize the flux of time.

The first three chapters of the book narrate the first days of the hero on the mountain. Also, the first three weeks of Castorp's visit to his cousin are narrated in detail, whereas narration of the second three weeks is quite vague on the passing of time. So the narrative technique Mann is following is quite clear, he is aiming to embody his theory of time: the duration of events is directly linked to how they are experienced by people. In the second three weeks Castorp is ill, and while in bed he is inactive, and no important event seems to occur in the sanatorium.

In the end, one of the important references to understand the irregular passage of time is the relationship of the 'story time' to the length of each chapter. For the development of the narrative Bergson's idea of *durée* is constantly in evidence, as a guiding theoretical framework.

3.2.3. *Relativity Theory and* The Magic Mountain

The relationship of *The Magic Mountain* to Einstein's relativity theory has been frequently discussed[316]. The article "Okkulte Erlebnisse", published in 1924, the same year *The Magic Mountain* came out, reflects Thomas Mann's own concerns with it, showing he was not only familiar with it, but that he had grasped some of its physical implications.

> Als ob nicht die exakte Naturwissenschaft selbst an einem Punkte hielte, wo ihre Begegnung mit der Metaphysik unvermeidlich wird! Die Tatsache, dass ich von der Lehre des berühmten Herrn Einstein sehr wenig weiss und verstehe (ausser etwa, dass dennoch die Dinge eine „vierte Dimension" besitzen, nämlich die der Zeit), hindert mich so wenig wie jeden anderen intelligenten Laien zu bemerken, dass in dieser Lehre die Grenze zwischen mathematischer Physik und Metaphysik fliessend geworden ist. Ist es noch „Physik", oder was ist es eigentlich, wenn man sagt (und man sagt heute so!), die Materie sei zuletzt und zuinnerst nicht materiell, sie sei nur eine Erscheinungsform der Energi, und ihre „kleinsten" Teile, die aber bereits weder klein noch gross sind, seien zwar von zeiträumlichen Kraftfeldern umgeben, aber sie selbst seien *zeit- und raumlos*?'[317]

Mann's mention here of the fourth dimension and his description of Einstein's theory are examples of how the encounter of scientific theories with metaphysics is inevitable and that the border between mathematical physics and metaphysics nowadays is becoming blurred. He ascribes this to the idea that matter is only a manifestation of energy. He also questions the idea that the smallest part of matter, which is surrounded by space-time fields, could at the same time be time and space. Mann was interested in Einstein's theory more because of its metaphysical implications, which were in accordance with his idea of time, than with the scientific theory itself. However, as will be seen at the end of this section, physics, metaphysics and the relativity theory will all be

---

[316] Scholars such as Rudi Prusok and Valerie D. Greenberg have made contributions to this topic.
[317] Mann Thomas. *Aufsatze Reden Essays. op cit*. p. 325. note 303.

related to the conception of time within *The Magic Mountain*.

In his article of 1905 Albert Einstein spoke about the contraction of time while the velocity of an object was approaching to the velocity of light. At the beginning of his article he makes two main assumptions. The first concerns the non-variety that the Maxwell equations[318] should maintain, while different observers are travelling with constant velocities, without taking into consideration the direction speeds of the respective velocities. The other refers to what he calls the "Principle of Relativity", where the velocity of light remains always a constant number no matter what the emitter or the observer motion is. These two postulates will change the entire notion people had about time and space before 1905.

In the very first two pages of the article, apart from defining these two postulates, Einstein is also concerned with the definition of basic notions such as position, motion and time. There are brief paragraphs defining these three concepts, and while doing this the concept of simultaneity came to be mentioned. Defining his position, he used a "system of coordinates" where the Newtonian equations can be applied and "hold good". Early in the article he starts to use the word relativity for the description of his system of reference:

> If a material point is at rest relatively to this system of co-ordinates its position can be defined relatively to thereto by the employment of rigid standards of measurement and the methods of Euclidean geometry, and can be expressed in Cartesian co-ordinates.[319]

Up until this moment Einstein had maintained the Newtonian model. However, in the next paragraph he starts to re-direct the notions of motion and time so far understood by Western culture. The concept of simultaneity of events is one of the crucial aspects of the development of the relativity theory due to its ability to relate the idea of motion and time. It is the first time that the concept is used for the measuring of time by the occurrence of different events:

> If we wish to describe the motion of a material point, we give the values of its-co-ordinates as functions of the time. Now we must bear carefully in mind that a mathematical description of this kind has no physical meaning unless we are quite clear as to what we understand by "time." We have to take into account that all our judgements in which time plays a part are always judgements of simultaneous events. If, for instance, I say, "That train arrives here at 7 o'clock," I mean something like this: "The pointing of the small hand of my watch to 7 and the arrival of the train are simultaneous events.[320]

So the idea of measuring time is based on events that are happening within a space simultaneously; time is measured starting from spatial events and their interactions. The next paragraph of the article clarifies this connection and expands the idea making a comparison of

---

[318] The Maxwell equations are four partial differential equations that describe the behaviour of the electric and magnetic field concerning its sources, which are the charge density and the current density. They also describe how these fields develop as time passes.

[319] Einstein Albert. *On the Electrodynamics of Moving Bodies*. Annalen der Physik (1905). Cited in *The Discoveries* by Alan Lightman. Vintage. 2005. p. 73.

[320] Einstein Albert. *op cit.* p. 73, note 319.

spatial events with temporal events.

> It might appear possible to overcome all the difficulties attending the definition of "time" by substituting "the position of the small hand of my watch" for "time." And in fact such a definition is satisfactory when we are concerned with defining a time exclusively for the place where the watch is located; but it is no longer satisfactory when we have to connect in time series of events occurring at different places, or—what comes to the same thing—to evaluate the times of events occurring at places remote from the watch.[321]

This is Einstein's starting point on the relationship of time, space, and how natural phenomena evolve within the continuum of these two concepts. He then develops some of the consequences arising if these basic principles, the non-variety of Maxwell Equations and the 'Principle of Relativity', are taken into consideration. One of these consequences is about how the time employed to travel a distance by objects that are moving closely to the velocity of light is contracted, if a comparison is made with the time employed by objects that are moving at a slower velocity. This phenomenon is a consequence of the two constraints Einstein imposed at the beginning of his article.

In *The Magic Mountain*, based on a very carefully elaborated thought structure, Mann spoke in a completely different way about relativity and the characteristics of time. This characteristic depends more on a confrontation of the human being with his/her perception of the flux of time without the help of any measuring device, which was what Einstein clearly proposed in developing his theory. The starting point for Mann's intuition, as already mentioned, is that the human being has no way to perceive the 'real' passage of time. So the perception of time has to be linked to space. It has to be translated into what our sense of sight can allow us to perceive. That is, the passage of time only can be measured by the natural spatial changes such as day and night and the seasons, or artificially by material objects such as clocks and calendars.

If an experiment could be carried out where spatial objects cannot be perceived, as happened to Castorp while completely surrounded by snow, where the sense of sight could not help him to recognize his surroundings:

> Masses of flakes flew directly into his face, then melted, freezing his features. They flew into his mouth and vanished with a faint watery taste, plastered his eyelashes, making him squint and blink, inundated his eyes until there was no hope of even trying to see—which would have been useless in any case, because the veil of blinding white obstructed his view and made the act of seeing almost totally impossible. And when he forced himself to look, he was staring into nothing, into white, whirling nothing.[322]

And if any of his senses could help him to recognize his spatial surroundings, as he is feeling while he is within the snowstorm 'In reality, he was already badly battered, and was struggling

---

[321] Ibid. p. 73.
[322] Mann Thomas. *The Magic Mountain. op cit.* p. 473-474, note 258.

against his incipient sensory muddle but in a muddled and feverish way.'[323], then a human being would be incapable of recognizing or sensing the passage of time. After the snowstorm and his confused wanderings, Hans Castorp feels that it should be getting late because according to his perceptions, a considerable amount of time has passed, although according to what his clock had measured, only fifteen minutes had passed. Due to the lack of spatial references he has completely lost a reference point from which he could measure the flux of time, and according to his own experience, those 15 minutes for him lasted a great deal longer because he felt lost, and was worried about the situation he was experiencing, not being aware either of his clock or of the flux of time: '"Time has slowed down for me…"'[324].

What Mann is proposing is: the recognition of time by human beings in a spatial isolation without the need of devices for measuring it, but only via a person's perception. What he had found out is that this time is relative because it cannot be measured without spatial references. And the way he reflected his idea of relative time was to use his two different times; the "narrative" and "story" times.

Starting from the same concept of simultaneity Einstein started from the elaboration of his theory, Hans Castorp, in the same conversation that he has with his cousin while he is measuring his temperature, emphasises a characteristic that has to be considered before taking into account the simultaneity of events, which is, how people feel the passage of time.

> Joachim contested this. "Why is that? No. We do measure it. We have clocks and calendars, and when a month has passed, then it's passed—for you and me and everyone."
>
> "But wait," Hans Castorp said, holding up a forefinger next to one bloodshot eye. "You said that a minute is as long as it seems to you while you're measuring your temperature, correct?
>
> "A minute is as long as…it Lasts, as long as it takes a second hand to complete a circle."
>
> "But how long that takes can vary greatly—according to how we feel it! And in point of fact…I repeat, in point of fact," Hans Castorp said, pressing his forefinger so firmly against his nose that its tip was folded to one side, "that's a matter of motion, of motion in space, correct? Wait, hear me out! And so we measure time with space. But that is the same thing as trying to measure space with time—the way uneducated people do. It's twenty hours from Hamburg to Davos—true, by train. But on foot, how far is it then? And in our minds—not even a second!"[325]

For Thomas Mann, this is the main subject of his book, to recognise the feeling of the passage of time. And this feeling is not supported by measuring time, because it does not matter whether clocks and calendars are able to measure its passage, human beings will still continue to feel the passage of a minute, for example, as not the same in every situation. Just as Einstein did in his 1905 article, Castorp recognises that space is the basis on which time can be measured. However, as in

---

[323] Ibid. p. 475.
[324] Ibid. p. 479.
[325] Ibid. p. 64.

the above last sentences, to 'measure time with space' is as arbitrary as to 'measure space with time', because to establish how long it takes to reach one place from another, depends mostly on the way you travel. So the feeling concerning the flux of time that the protagonist of the novel perceives is that time is not a concept that can be measured; it cannot be measured as science was claiming it could.

So *The Magic Mountain* is a response to the relativity of time of Einstein's theory. And it is not a response in the sense of a contradiction, for Mann is not really contradicting Einstein because what Einstein had explained was how time experiences a contraction due to the way it is being measured, whereas Mann's observation is that measuring time will not give a response to how a person feels its passage. What he proposes is that time is not a concept that can be measured because people feels its passage in different ways, depending on their emotions and their surroundings.

Mann and Einstein are not exploring the same feature of the concept of time, Mann is responding to the relativity of time by focusing his attention on a problem, which perhaps philosophers have been more concerned with than scientists. However, as mentioned earlier, Mann's book is a compendium of the scientific advances until the beginning of the century, so we may take Mann's arguments on time as a criticism of the way science was addressing its advances on time's nature.

As was seen in the first section, Thomas Mann's characters place great trust in the power of science to understand nature, including time as a fundamental concept. Later on in the book, at the beginning of chapter six and after Castorp's first six months on the mountain, the introduction of the chapter seems to be directed at a specific person. The narrator speaks about "desperate attempts" to understand the nature of time.

> What is time? A secret—insubstantial and omnipotent. A prerequisite of the external world, a motion intermingled and fused with bodies existing and moving in space. But would there be no time, if there were no motion? No motion, if there were no time? What a question! Is time a function of space? Or vice versa? Or are the two identical? An even bigger question! Time is active, by nature it is much like a verb, it both "ripens" and "brings forth." And what does it bring forth? Change! Now is not then, here is not there—for in both cases motion lies in between. But since we measure time by a circular motion closed in on itself, we could just as easily say that its motion and change are rest and stagnation—for the then is constantly repeated in the now, the there in the here. Moreover, since, despite our best desperate attempts, we cannot imagine an end to time or a finite border around space, we have decided to "think" of them as eternal and infinite—in the apparent belief that even if we are not totally successful, this marks some improvement. But does not the very positing of eternity and infinity imply the logical, mathematical negation of things limited and finite, their relative reduction to zero? Is a sequence of events possible in eternity, a juxtaposition of objects in infinity? How does our makeshift assumption of eternity and infinity square with concepts like distance, motion change, or even the very existence of a finite body in space? Now there's a real question for you![326]

In the first lines Thomas Mann recognises how natural phenomena take place in the space-time continuum, and wonders if time depends on space or whether it could be thought of the other way

---

[326] Ibid. p. 339.

around, space as a function of time. The clearest manifestation Mann recognises in time is that it brings 'change'. Recognizing the concept of infinite time and space, two of the concepts that Spengler pronounced as fundamental for Faustian culture, Mann asks how can time and its infinite quality be compared with distance, motion, change and bodies. The last paragraph taken from *The Magic Mountain* is argued using a scientific language where the topics of time and space are addressed.

One crucial difference between the way Einstein and Mann conceive of time has to do with their particular starting point. For Mann time is relativistic due to how each person feels its flux, which is why in his narrative there is a clear distinction between the 'real time' and the 'time of its content', whereas for Einstein time is relative due to the relationship between objects and the proposed frame of reference.

The Magic Mountain is a narrative experiment that suggests how difficult it is to measure time without spatial references. The Berghof sanatorium is completely isolated and without spatial references, as when Hans Castorp got lost in the snow and the measuring of time becomes impossible; the measuring of time is relative to spatial considerations and science, despite its advances in recent years, was still unable to provide an answer to the question raised by Mann in the course of the novel.

However, the connection between Thomas Mann and Einstein has not only to do with the starting points from which they both clarified the conception of a relative time. There is also the conception of time as a 'mystic element', another theme Mann dealt with in his novel.

From his youth Thomas Mann had considered Schopenhauer one of the greatest philosophers[327]. And from him, Mann had understood the idea of a mystical *nunc stans* (Latin for 'abiding now'). The *nunc stans* is known as the moment when time collapses and does not continue its infinite pace. In Mann's novels certainly the idea of this collapse of time occurs repeatedly. One of the moments is in the snow section, and at the end of the book another clear example is when war is just about to break out, and the long period of peace is about to end.

This mystical moment is where the metaphysical and the physical converge, and where for Mann, Einstein and Schopenhauer's ideas collapse. In fact, according to Mann's biographer, was searching for this connection from the 1920s:

> Thomas Mann had searched for this missing link since the twenties. "The fact that I know and understand very little about the theory of the famous Mr. Einstein," he explains truthfully in 1923, "does not prevent me from observing that in this theory the boundary between physics and metaphysics has become fluid."[328]

---

[327] It is known that in the winter of 1899-1900 he read Schopenhauer master's work *The World as Will and Idea*.
[328] Kurzke H. *op cit*. p 523, note 259.

The figure of Hans Castorp, engineer and man of science, is the perfect alibi for reflecting this mystical moment in the experiences of the protagonist on the mountain. In *The Magic Mountain* the concept of time is not only a spatial measurer of actions but is also, and at the same time, a metaphysical element, which was also contained in Einstein's theory. In 1932, Mann wrote a highly significant letter where he clearly notices the similarities of *The Magic Mountain* to ideas of Novalis and Albert Einstein, despite recognizing he had never attained profound knowledge of either.

> The essay on Novalis was new to me, and I was astonished not only by your mathematical accomplishments but specially by Novalis's visionary anticipation of Einstein's theories. It is curious enough to see how he advances from Kantian epistemology to physics. I had never noticed that. But it is evident that the musings on time in *The Magic Mountain* are of an entirely different character from Proust's—that is, their origin is romantic, as are the "biological" elements in that book. In the past I too truly grasped (through Schopenhauer) only the "ideality" of time and space, and arrived at their physical relations without having properly read Novalis, let alone Einstein.[329]

In the first decades of the 20th century both Einstein and Mann shared a constant concern with the notion of relative time and its flux. They gave their own particular answers based on the imaginary experiments which each of them grounded in different fundamental questions such as: can the flux of time be felt? and how can the flux of time be measured?

Conclusions

What has been shown above were mainly four themes basic to the recognition of the relativity of time in *The Magic Mountain*: Hans Castorp as a scientific figure, relative time as a main 'symbol' in Spengler's sense, the concept of durée, and the confrontation of Einstein's relativity theory with Mann's theory. These four arguments surrounded the development of the idea of a different time conception within the novel.

The conception of Hans Castorp as a scientific character is the fundamental argument that Thomas Mann developed to show his engagement with themes related to time and space. Only an inquiring mind such as the novel's hero could reveal the period's preoccupations and constantly wonder about the space-time relationship. Through *The Magic Mountain* Castorp developed a strategy to recognise time as a pure element, his approach to the topic being from the viewpoint of a scientist who understands that the fundamental question one should ask is: how is humankind capable of feeling time? Castorp starts his inquiries at the precise moment of his arrival at the Berghof Sanatorium, when he notices that the feeling of the flux of time in the mountain cannot be recognised. As time go by, the hero pace by pace will acquire the same sensibility towards time, step by step, in the same way as all the other characters had already acquired it previously.

---

[329] Mann T. *Letters of Thomas Mann: 1889-1955. op cit.* p. 192, note 306.

The three main characters are a clear representation of what Thomas Mann wanted to outline from the epoch he was living in; the fundamental role that science and technology was achieving for the progress of Western culture. The novel is a reflection of some of the most important scientific dilemmas of the epoch.

As part of these re-definitions time is in the centre of the discourse, the topic of time being constantly present throughout the novel. Every chapter is focused on a particular aspect of the relativity of time. Its narrator is constantly directing what happens in the novel towards a philosophical digression on time. In general, *The Magic Mountain* is a novel deeply interested in outlining the nature of time and how humanity feels its flux. This happens when a person 'awakes' from a certain monotonous and repetitive situation.

Within *The Magic Mountain* the narrator gives a definition of two different times that occur while a narration of events is taking place. There is the 'real' time, the time that can be counted with a clock and can be compared with the events of the story whereas the 'time of its content' is the flux of time, as the characters perceive it depending on the situations they are immersed in. The feelings and experiences that they are passing through at any precise moment will be decisive for how they feel the passage of time, which may be faster or slower, but will definitely be relative to the situations and not to the surrounding space. These two different times are contained within the narrative and the narrator must be able to explore them while the story is taking place.

Mann portrays situations where the recognition of time cannot be achieved due to the diverse lack of elements to measure it with. The same phenomenon occurs when Mann wants to emphasise the modern conception of space as an infinite entity. In the section '*Snow'*, space acquired an infinite characteristic.

Chapter seven deals with the idea of narrating time, Mann reaching the high point of his thoughts regarding time and its flux. After this episode, there will be a constant feeling of the characters waiting for something to happen. In the end what happened was the beginning of the Great War.

The vision of time Mann offers can be compared with some of the ideas on the flux of time of some contemporary philosophers, in addition to the physicists. Spengler, Bergson and Einstein and their various theories are fundamental for the recognition of relativity time.

Oswald Spengler's *The Decline of the West* was important in the sense that he spoke about certain ideas that are generated and are in the core of entire cultures. He believed that these ideas came to be the principal 'symbols' of the cultures by being represented in every intellectual activity developed by the society, from art and architecture to science and technology. Two 'prime symbols' that Spengler denoted as characteristic of the so-called Faustian culture were infinite space and the infinite-relativity duality of time. Both ideas were also fundamental for the development of Mann's

novel, and were represented in the Berghof Sanatorium and fully contemplated by Mann as essential for the narration of events.

With an already established idea of a relative time and an infinite space Mann turned his attention to the duration of events. For Mann there is no way objectively we can measure time. People's feelings dictate the duration of events, each instant can be felt differently despite the clock ticking another period of time. This idea runs in parallel with the one of durée developed by Henri Bergson towards the end of the 19th century, Bergson signalling a difference between 'abstract' time and 'real' time. His 'abstract' time is useful for society in its organisation, whereas 'real' time can only be perceived, and never measured with devices such as calendars or clocks. The concept of 'durée' is immersed within the concept of 'real' time, and is the duration of events as people recognise them. Only consciousness is able to recognise this duration and it cannot be constrained by measurement.

The Magic Mountain is a refutation of some aspects of Einstein's relativity theory of 1905. And it is a refutation not towards the practical aspects treated in the theory but concerning the principles that allowed Einstein a measurement of time. In Mann's novel, time is dealt with at its most basic; both the narrator and Hans Castorp developed a recognition of what the nature of time and its relationship with space was in its purest form. On the other hand, Einstein's theory took this nature of time for granted, and began from the assumption that time can be measured and that clocks and calendars are objective measurements of it. In his theory, Einstein never considered the idea of how humanity feels time.

Mann never contradicts Einstein, but started from more human intuitions that have to be taken into consideration. In the end Mann's novel is a criticism of the starting point Einstein adopted in his theory. Mann understood that measurement comes after the primary feeling of the flux of time. The significant similarity that can be seen between *The Magic Mountain* and the relativity theory is that both of them consider that time has to be taken as relative. For Mann time is relative depending on the circumstance in which a person is immersed whereas for Einstein, the object is at the centre of attention. Both men liked to make imaginary experiments and *The Magic Mountain* is a well turned out experiment on the nature of time.

The 1910's and the beginning of the 1920's saw the relativity of time at a crossroads in human activities, and this phenomenon can be perceive in the novel of Thomas Mann. He accurately developed and achieved a version of the concept supported by fields of knowledge such as philosophy, physics, biology and medicine, developing his own 'theory' of how people perceive the passage of time, different from current scientific ideas, that were concerned to measure time supported by mechanical devices such as clocks and calendars, without taking into consideration

how the human being actually feels its flux.

Chapter 4.

ACAUSALITY: AN EARLY RECOGNITION IN MUSIL'S NARRATIVE.

In the first decade of the 20th century Robert Musil put his promising career as an engineer to one side, and became a writer. He was not at all in a fight with the exact sciences, although his love for literature and writing was more decisive for his future. His doctoral studies, which he finished them in 1908, were a reflection of this change of interests. The topic of his dissertation had to do with fields such as the psychology and philosophy of science. And when he finished his studies he finally decided to become a writer. Musil's case is a clear example of the interaction of science and literature; he became a novelist with a profound interest in topics related to science.

The Man without Qualities includes science and technology as important systems of knowledge able to help us understand the world. However, the characters take a variety of positions on the landscape of science and the benefits or the problems of the use of technology. On the one hand, Ulrich, the main character, is a mathematician, who considers science and technology the knowledge that can bring progress to Austrian culture. On the other hand, the figure of Arnheim is someone who knows the importance of science and technology, but does not consider them the most important elements for the development of a society.

Through this duality of thought, of characters for and against science and technology, with Arnheim doubtful about its ability to provide progress for humanity, Musil reflected a great interest in understanding the role that science and technology were acquiring as fields of knowledge. Through the impressions of the characters, Musil will question the ability of science to explain the world, and whether there exist limits for science, and technology based on science.

Musil's intentions were not so much to give a definite answer to these questions, as to confront the relevance of science and technology for the explanation of the world through his narrative. By the end of the book, the main character will understand that science and technology are not sufficient to achieve a complete understanding, that feelings are also essential, and that the single minded pursuit of truth is not worthwhile because a clear answer cannot be found. In a sense, as will be seen in this chapter, Musil believed that science and technology were fundamental fields of knowledge for the explanation of the world, but that the arts and humanities have a similar role. So only by taking into consideration the knowledge that both spheres provide, can we achieve a more complete appreciation of the world.

In his narrative, Musil proposed that to understand concepts such as acausality and destiny, the spheres of art and science are both of them necessary. The second part of this chapter will focus on this topic.

The Man without Qualities is a compendium of the transformations that the principle of causality underwent by the early 20th century. This principle evolved in scientific discourse as well as in the narrative discourse. The concept regards the recognition that acausal events are the ones which dictate the way in which the lives of the characters will be addressed, their destiny.

The purpose of the second part of the chapter is to show how the narrative reflects the concept of acausality, and how by including this concept, it pointed more towards an antirealist vision of the world than a realist one. It will be shown that the ideas of two authors were fundamental to the introduction of acausality in his work, one of them Oswald Spengler in *The Decline of the West*, the other, Ernst Mach, and the ideas that Musil worked with while developing his doctoral thesis.

The chapter is divided into two different parts. The first contextualizes the science and technology that can be found within *The Man without Qualities*. Here will be seen the epistemological basis on which Musil developed his narrative and how this basis was constantly interacting with scientific concepts. Furthermore, the plot, the technique and the characters of the novel are all part of a scientific discourse. In this first part Musil's scientific knowledge is described, and how he applied it to his narrative. However, in this part will also be outlined the different positions each character takes regarding science and technology, and the benefits or sufferings these fields of knowledge will lead to in society.

The Decline of the West was read several times by Robert Musil. As can be seen from his diaries, he developed a relationship with concepts such as destiny, symbol and acausality. The second part of the chapter provides an account of how in his last novel he confronted the several themes he found in Spengler's book.

The second part of the chapter also deals with his interaction with the philosopher Ernst Mach. He had written his doctoral thesis on Mach's theories, and he profoundly explored where he really stood on Mach's philosophy of science. When he wrote his thesis he strongly criticized Mach's position, and it seems he was supporting the conviction that the principle of causality must exist for the development of science. However, in *The Man without Qualities* there is a change in this conviction, signs of a move towards an acausal position, and this second part of the chapter speaks about the acausal conception in Musil's last novel. It outlines those of Mach's and Spengler's positions to be found in Musil's narrative, and also how Musil arrived at the notion of acausality in his narrative, supported by the ideas of these two thinkers. It also shows some parallels between the novel and Quantum Mechanics theory.

By the end of the chapter it will be seen that, although Musil was still part of a realist literary tradition, with the concept of acausality his narrative was pointing towards an anti-realist vision of the world where the characters of the novel, no matter how their confidence stood up on science and technology, could have no clear idea of their destiny, and of the future in general. They were in a chaotic world where the principle of causality could no longer predict future events.

4.1. *The Man Without Qualities: Its Scientific and Technological Approach*

The relationship between science, technology and Robert Musil has first to be contextualized in the age in which he lived, then in the strong affinity he felt towards them, and then into how they are reflected in his last novel *The Man without Qualities*.

It may be said that the ideas behind the novel were born in the 2nd decade of the 20th century, when Musil became a full-time writer and when his rapport with science and technology was became closer than ever before. In this period Musil will define the epistemological condition of science, thinking of it not as a threat to tradition, but indeed as a tradition on its own.

To Musil, the sixteenth and seventeenth centuries had seen the beginning of this tradition, and thinkers such as Copernicus, Kepler, Galileo and Newton were to be remembered not only as the pioneers of modern science but also as the pioneers of a strong and fruitful tradition, which had changed the relationship between humanity and nature.

As pointed out in the introduction of this thesis the figures of the scientist and the engineer, recently accepted as social figures of Western Culture, now had accepted credentials to speak about nature. The principal character of *The Man without Qualities* is a mathematician, who trusts in science as a source of knowledge.

However, at the time he was writing the novel, the position of thinkers was completely different, believing science to be a past source of knowledge that should no longer be considered. Musil understood that the principal problem of this negative position was neither science nor technology, but the social and political institutions. After the First World War, society was re-evaluating the benefits and/or the sufferings that science and technology bring to people, and Musil portrayed this. The different feelings in society towards science and technology is one of his main themes. The characters and their different attitudes will reflect the different positions concerning science and science-based technology of people after the First World War.

He does ascribe strong importance to science and mathematics as part of an imminent future society. Musil mixes science and mathematics with personal experiences and feelings. He thinks of science as one of the basic subjects to explain the world, not only nature but also the interaction of human beings. The role that the narrative plays in Musil's book is to join the human aspect with the

explanation science and mathematics gives concerning the world. One of the main objectives of the novel is to show the reader a complete framework of the human knowledge so far generated.

There are many ways in which science and literature interact in Musil's book. Apart from the main character Ulrich, some of the secondary characters are designed to have an inclination towards an analytic perception of life where science is involved. The role of the metaphor in Musil's perception is one of the most important aspects to establish the connection between science and human behaviour, his way to move from one area to the other. One of the principal characteristics of the narrative is how Musil shapes the cultural and social atmosphere based on the science and technology of his age; he based the description of his own characters and their experiences in what science and mathematics were able to reveal about the world.

In the very first paragraph of the novel Musil describes the atmosphere of a nice day from a scientific point of view. Here technological terms are mentioned, whose purpose is to provide the most accurate description of a moment, Musil pursuing epistemological clarity. This description in a more traditional narrative style would have been portrayed with adjectives like beautiful, lovely or nice. In the end, the narrator decided to summarise his entire technological description with the word "fine":

> A barometric low hung over the Atlantic. It moved eastward toward a high-pressure area over Russia without as yet showing any inclination to bypass this high in a northerly direction. The isotherms and isotheres were functioning as they should. The air temperature was appropriate relative to the annual mean temperature and to the aperiodic monthly fluctuations of the temperature. The rising and setting of the sun, the moon, the phases of the moon, of Venus, of the rings of Saturn, and many other significant phenomena were all in accordance with the forecasts in the astronomical yearbooks. The water vapor in the air was at its maximal state of tension, while the humidity was minimal. In a word that characterizes the facts fairly accurately, even if it is a bit old-fashioned: It was a fine day in August 1913."[330]

This first paragraph shows a tendency to reflect a hyper-realistic narrative where science and technology and their technical language provide a precise perception of the events, in fact they provide an over determined vision of them. However, when the notion of acausal events enters into the narrative's world, this realistic posture will be transformed into a more anti-realistic vision.

The narration continues with a technological style and the city where the story will take place comes to be seen as a thermodynamic process where several ingredients have to be taken into account for the final result.

Science and technology alter the description of events by creating a sense of precision, for example: different descriptions of a colour can be interpreted in a more scientific way. To the narrator it is not enough to say red because in the visible spectrum many different wavelengths can be taken as red. Due to the increasing specialization of science, society was getting used to the exact

---

[330] Musil Robert. *The Man Without Qualities*. Translated by Sophie Wilkins and Burton Pike. Picador. 1997. p. 3.

description of objects, and science and technology were helping to achieve this description although in the end, the author does not allow this description to remain the most important aspect of the facts.

> Why are we satisfied to speak vaguely of a red nose, without specifying what shade of red, even though degrees of red can be stated precisely to the micromillimeter of a wavelength, while with something so infinitely more complicated as what city ones happens to be in, we always insist on knowing it exactly?[331]

This is how Musil from the very beginning of his novel is telling the reader the perspective from which the events will be presented and analyzed by the narrator, as well as by the characters. Emphasis is on Austrian society's reception of scientific and mathematical concepts, seen through the lens of literature. He reflects the social environment of the Austro-Hungarian culture of the 1910's, by science and the methodology of its time. To sketch the ideas of science and mathematics within literature is to reveal what the society understood and was eager to know about these topics.

He explains events by science and technology, for example, a car accident can be reduced to the inefficiency of the brakes, which can take time to function and lead to an accident, and he then enters into statistics to see how many car accidents there are in a year. His background comes into this: Musil the engineer is describing the event from the point of view that the machine did not work correctly due to the lack of improvements in the technology of the vehicles of the time: "The brakes on these heavy trucks take too long to come to a full stop,"[332] although Musil the traditional novelist also runs another version, the woman's "she did not really understand or care to understand the technology involved, as long as his explanation helped put this ghastly incident into perspective by reducing it to a technicality of no direct personal concern to her."[333] This dialogue illustrating the technological aspect of an incident, and the human one, is a good representation of Musil's interest in the role that science and technology was playing in society.

Musil's vision of the topics of science and mathematics is the same as Forman and Spengler's, where a certain decadence in society and culture had given rise to a strange confidence in the concept of acausality.

4.1.1. *Ulrich*

The main character, Ulrich, is a mathematician who gets involved in a governmental project called the "Parallel campaign" or "Collateral campaign", for the preparation of the 70th anniversary of the Austrian Emperor Franz Josephs' reign. It is 1918, and the same year this celebration took place, the German emperor Wilhem II was celebrating 30 years of his reign. The purpose of this

---

[331] Musil R. *op cit*. p. 4, note 330.
[332] Ibid. p. 5.
[333] Ibid. p. 5.

campaign was to show to the world the magnificence of Austria as a culturally, philosophically and scientifically advanced country, to produce an idea able to embrace and unify these subjects. To achieve this, Ulrich and other Austrian personalities are selected.

Ulrich is the face of the scientific and mathematical outlook, his job is to abstract an idea and convert it into a material object. For the celebration of the Austrian year or World year the committee had to find a symbol able to represent and reflect Austrian culture. Of course this symbol or symbols had to materialise and to reflect the general cultural situation. As will be seen, the whole project Musil supplies is a reflection of Spengler's ideas.

Ulrich is a very particular hero; he is 32 years old and has a very analytical personality. For example, instead of watching pedestrians on a street he sees the interaction among the forces and masses involved in the movement of the bodies.

> He was gauging their speeds, their angles, all the living forces of mass hurtling past that drew the eye to follow them like lightning, holding on, letting go, forcing the attention for a split second to resist, to snap, to leap in pursuit of the next item…then, after doing the arithmetic in his head for a while, he slipped the watch back into his pocket with a laugh and decided to stop all this nonsense.[334]

He can also see a boxer as a rational system based on coordinated movements, making a comparison between mathematics and boxing, arguing that the logical abilities needed to grasp mathematics are not so very different from the movements a boxer requires.

The technocratic spirit that Austrian society was living in at the beginning of the 20th century frames Ulrich's aspirations. However, when he wanted to become an engineer, he saw the limits to thinking and understanding the world when a man's ideas were to be found between machines and his own soul. So he decided to become a mathematician, where these limits do not exist. In the way he sees it, mathematics experienced as a religion allows us to break with irrationality and understand life from a different perspective: Mathematics would eventually destroy the human soul and give rise to a world ruled by human beings, who would become slaves of their own material ideas, the machines.

> There is really no need to belabor the point, since it is obvious to most of us these days that mathematics has taken possession, like a demon, of every aspect of our lives. Most of us may not believe in the story of a Devil to whom one can sell one's soul, but those who must know something about the soul (considering that as clergymen, historians, and artists they drew a good income form it) all testify that the soul has been destroyed by mathematics and that mathematics is the source of an evil intelligence that while making man the lord of the earth has also made him the slave of his machines.[335]

Ulrich is an unsatisfied logician who used to work on modern theoretical principles without being entirely convinced by them; he preferred, for example, Aristotelian methodology. He found his way of life in science and mathematics, choosing it as a life style in which he found comfort.

---

[334] Ibid. p. 7.
[335] Ibid. p. 36.

For Ulrich, the question of how to live rightly was the only important question, he devoted his life to science and mathematics because he found in them a way to understand.

> If someone had asked him at any point while he was writing treatises on mathematical problems or mathematical logic, or engaged in some scientific project, what it was he hoped to achieve, he would have answered that there was only one question worth thinking about, the question of the right way to live.[336]

As the narrator pictures the personality of Ulrich, it can be inferred that Ulrich considers mathematics as the path to a 'right way to live'. This sentence speaks volumes about what science and mathematics signified for a part of Ulrich's society. The narrator uses the word right, which belongs to the moral sphere, if Ulrich is working on mathematics because it is right, then for him mathematics has a moral connotation. Ulrich's world is a world where science and mathematics are part even of the way in which life should be lived.

However, by the end of the novel, Ulrich has recognized that living was not only a matter of understanding but also of feeling, and that the pursuit of truth was not the real issue, humanity should not waste time thinking about it. Musil will reflect that science and arts are both necessary for the understanding of the world. In several conversations between the characters the idea that neither of these areas of knowledge should be taken as more important than the other. In addition, there is the idea that neither of these two fields offers a better approach to understanding relationships between people, as well as the relationship of humanity with nature. To some extent, one of the main ideas Musil is constantly addressing is the idea that sciences and arts are both indispensable for the understanding of the world. Ulrich, as a man of science, in the course of the novel will understand that science and technology by themselves cannot describe every single aspect of the world, that the feelings of people and their relationships with others cannot be explained by science and technology. Ulrich is portrayed as a researcher, but not only a scientific researcher:

> What he meant was not a life of 'research', or a life 'in the light of fire', but a 'quest for feeling 'similar to a quest for truth, except that truth was not the issue here.[337]

Ulrich regarded science as a practice for the understanding of human problems, allowing science some ability to provide solutions even in areas like human feelings, making a comparison between terms denoting his own feelings towards science and its scope:

> If we translate "scientific outlook" into "view of life", "hypothesis" into "attempt", and "truth" into "action", then there would be no notable scientist or mathematician whose life's work, in courage and revolutionary impact, did not far outmatch the greatest deeds in history.[338]

As Ulrich's childhood friend Walter says, Ulrich is a man without qualities, very intelligent, but

---

[336] Ibid. p. 275.
[337] Ibid. p. 1128.
[338] Ibid. p. 37.

for some, with profound lack of personality, ascribed to the decadent milieu in which he was born; Ulrich is not able to judge circumstances unfolding before his eyes, giving only his opinion. According to Walter, this is a characteristic shared by many men of the time, who were observers of the circumstances but who were not participants in the events, they just think about possibilities of action, but normally did not act.

In Musil's world, science and its mathematics had dictated a style of life, isolating experiences that before were considered as people's concerns. The spirit, the soul of the age had been translated into quantities, and people's minds had to readapt all this knowledge to understand the new world because over the years, to human eyes, nature had become increasingly complex. As Walter says:

> "Oh sure, sure," Walter interrupted this report. "First, four elements are turned into several dozen, and finally we're left floating around on relationships, processes, on the dirty dishwater if processes and formulas, on something we can't even recognize as a thing, a process, a ghost of an idea, of a God-knows-what. Leaving no difference anymore between the sun and a kitchen match, or between your mouth at one end of the digestive tract and its other end either.[339]

This re-adaptation involves the understanding of objects in a dual manner, as scientific as well as human entities. Walter's criticism of Ulrich's ideas refers to ascribing an existence to entities such as atoms and molecules that were created by science. Suddenly humanity is immersed in a world where atoms and their interactions are the only existing entities, where there is no longer a substantial difference between the sun and a kitchen match, for example.

For Ulrich, this is the era of abstraction, and Walter does not share his opinion, he was against giving too much credit to these entities and their materialization.

In a sense, Walter's criticism of Ulrich is the only quality Ulrich has. He is the only one able to perceive the epoch from outside, to perceive that humanity was living a re-conceptualisation of basic notions fundamental for the development of modern society. This is why he can grasp the various questions that have no answer, and permeate the hostile atmosphere of the era. The result is Ulrich's ability to think, for example, the equivalence between "swimming on water", a "storm of electricity" or a "sea of fire". He recognized the problem of human life as a mathematical problem with multiple solutions; as a question that could be answered by the theory of probabilities.

Ulrich regards mental arithmetic as a skill needed for any kind of work; to him human progress is based on processes of induction with the constant repetition of error, and statistics as a revealing subject within mathematics. For him every phenomenon is mathematical, it does not matter if it belongs to nature or to human behaviour. If it is human, then it belongs to statistics. He regards destiny as a collection of experiences that in the end can be translated into statistical terms.

> He went on calmly explaining that mental arithmetic was an indispensable skill in every line of work, that

---

[339] Ibid. p. 65.

to teach by means of games was in keeping with modern educational methods, that statistics had often revealed deep connections between things long before these could be explained.[340]

The German artist George Grosz, whose paintings illustrated Berlin life in the 20's, sketched a representation of this kind of modern man. Grosz' ideas show the geometrical modern man, and in 1921 he painted *The New Man*. According to Janet Ward, together with *Boxer*(1920/1921) and *Diabolo Player*(1921), *The New Man*:

> … depicts the geometrically configured man for modernity, who, as the epitome of Ulrich in Musil's novel The Man Without Qualities, strides in his room between various psychotechnical instruments of measurement and performance, all suggesting to the viewer the broad range of ultramodern professions that he practices: an engineer's design for a piston, an architect's T-square, a boxer's punching bag. Such is the New Man, the embodiment of Weimar surface…[341]

For the narrator, there was an irrationalism born of the primal form of religion in that era, represented by the social circle of Hans Sepp. This irrationalism will show that Ulrich did not think science was perfect knowledge, continuously exemplifying the limits of its idealism, its method and its precision.

> Has a tile ever fallen off the roof in precise accord with the law of falling bodies? Never. Even in the lab, things never behave just as they should. They diverge from the ideal course in all possible directions, while we keep up a fiction that is to be blamed on our faulty execution of the experiment, and that somewhere midway a perfect result is obtainable."[342]

Ulrich regrets the lack of knowledge humans have of scientists as human beings and as philosophers. He understands the negative passage from natural philosophy to science when people, starting from Galileo Galilei, saw only the superficial aspects of nature without having any intention of penetrating it.

Ulrich preferred to think of the history of ideas rather than the history of the world, that what has happened is more valuable than to whom, where or when.

> Ulrich presented them with his scheme for living the history of ideas instead of the history of the world. The difference, he said to begin with, would have less to do with what was happening than with the interpretation one gave it, with the purpose it was meant to serve, with the system of which the individual events were a part.[343]

The history of ideas gives rise to the thinking of symbols behind the culture; it could delineate the concepts in various contexts such as science, mathematics, art and literature.

As we have said, some of the ideas Ulrich and other characters develop as the representation of Musil's thought, owe a lot to *The Decline of the West*. Spengler will be useful later for two aspects of the novel, on the one hand ideas on causality, and on the other, ideas on personalities living in a

---

[340] Ibid. p.378.
[341] Ward Janet. *Weimar Surfaces: Urban Visual Culture in 1920's Germany*. London and Los Angeles. University of California Press. 2001. p. 60.
[342] Musil R. *op cit*. p. 624, note 330.
[343] Ibid. p. 395.

society where science and mathematics were becoming so significant.

4.1.2 *Other Characters*

Apart from Ulrich, various characters in *The Man Without Qualities* have their own opinions on science and mathematics. They are immersed in the conflicts of the age, on the acceptance or denial of science and its achievements, and not only science, but the whole cultural development where many areas were changing radically. Clarisse, another friend from infancy and Walter's wife, judges modern and future art as degenerate, a common reaction, like the feeling of uncertainty concerning human creativity and the human condition.

The hero is not the only character who recognises the changes science and technology had brought to ways of life. Diotima, Ulrich's cousin and one of the main organizers of the "parallel campaign", realized that living in this civilization was a *"frustrating condition"* because she could not understand who was in control. Society was having to deal with new achievements in science and technology, economic turmoil as well as political conflicts generating uncertainty and anxiety, not helping the human condition to adapt to the modern world. Humanity is not only an agglomeration of people living together in peace, although the common people were the ones who noticed this the most.

> At this point Diotima had discovered in herself the well known suffering caused by that familiar malady of contemporary man known as civilisation. It is a frustrating condition, full of soap, radio frequencies, the arrogant sign language of mathematical and chemical formulas, economics, experimental research, and the inability of human beings to live together simply but on a high plane.[344]

Diotima's house was where the reunions of the educated Austro-Hungarian community took place. In these reunions could be found anyone from a Quantum physicist to a Tokontologist. While these reunions took place, Diotima would think of the lack of spirit in society, but also in the power of symbols, which in her opinion were the elements that could reunite mankind. Emphasis is repeatedly placed on how the characters constantly feel lost in an atmosphere full of emptiness. But there is also hope in those same characters regarding the future. In fact, the entire campaign is meant to be a project for a new beginning, which this generation was constantly demanding.

A new beginning, to provide a better future, where science and technology could be used differently for the benefit of society and not against it, based on symbols to help people get rid of their bad feelings. And Diotima's house was where this project was taking place. *The Man without Qualities*, being written after the end of the First World War, some of Diotima's feelings regard the use of science for the development of war technology. Although the novel's context is before the war, the feelings of emptiness where she relates a 'malady of contemporary man', due to for

---

[344] Ibid. p.105.

example 'radio frequencies', has to do with the direction taken by some people who considered science and science-based technology the main factor provoking the 'frustrating condition' of humankind, unable to live without a constant search for knowledge, which caused so much pain.

The German Count Paul Arnheim, who is also involved in this project, comes to realise that this massive event, to show the world the greatness not only of the Emperor but also of the whole Austro-Hungarian Monarchy, is a reflection of the general cultural situation. Arnheim is a man who uses science to explain his general views, who mixes knowledge from different fields such as religion, philosophy and science, to achieve more precise explanations. He could write for example:

> The three of them were out for a walk, and Ulrich, in the midst of nature's desolate disarray, had to explain Arnheim's writings to her. These dealt with algebraic series, benzol rings, the materialist as well as the universalist philosophy of history, bridge supports, the evolution of music, the essence of the automobile, Hata 6o6, the theory of relativity, Bohr's atomic theory, autogeneous welding, the flora of the Himalayas, psychoanalysis psychology, social psychology, experimental psychology, physiological psychology, social psychology, and all the other achievements that prevent a time so greatly enriched by them from turning out good, wholesome, integral human beings.[345]

As will be seen, Arnheim's rhetoric was one of his most fundamental attributes. He was a businessman, but able to introduce concepts of science and technology to emphasise his thoughts, even if these belonged to other areas of study. He is the figure of the modern man who knows how the modern world works, understanding it and understanding the role science and technology play in it, important fields of knowledge helpful in the description of nature, but not the only ones. Arheim values universal knowledge and the approach this can provide to understand the world.

> That he [Arnheim] could discuss industry with industrial giants and the economy with bankers was to be expected, but he could also chat just as freely about molecular physics, mysticism, and pigeon shooting. He was an extraordinary talker; once he was off, he never stopped, like a book one cannot close until everything in it demanding utterance has been said.[346]

To Walter, Arnheim could express a new scientific spirit to transcend technical description, a man who understands the value of general knowledge, a man who lives according to his time, who just for a while approached religion just to go against money, science and the cultural environment. But who also could be considered a man of the future, who after finding no meaning in life, was able to open up to science and mathematics and then once again find meaning.

> At times he dreamed of a new Weimar or Florentine renaissance of industry and trade, new prosperity under the leadership of strong personalities, each of whom would have to be capable of combining individual achievements in technology, science, and the arts, and able to guide them from the highest standpoint.[347]

The new Renaissance Arnheim envisioned is related to his desire to take into account a universal knowledge for the understanding of nature and human relationships. In a sense Arnheim is the

---

[345] Ibid. p. 230.
[346] Ibid. p. 202.
[347] Ibid. p. 207.

antagonist of Ulrich, because he has a more holistic vision of knowledge whereas Ulrich is a character portrayed as a scientist with a more reductive vision of the world. The new Renaissance Arnheim dreams about has to do with the non-acceptance of the reductive vision modern science and technology was promoting.

Arnheim did not share the scientific and experimental way that Ulrich proposed to live life. He noticed small details where calculations were not as accurate as feelings could be, for example, what happens in billiards. He thinks that no matter how precise physics and its equations can be, a good billiard player will never stand upon the theory, he will trust only in his ability to hit the billiards.

Arnheim was a man who suffered from the atmosphere of the time and its consequences, such as the importance given to money, measurements, science and knowledge. He could understand an interaction between different fields of knowledge for the development and the progress of a nation. In his view, hard science and technology were not part of the most important knowledge that could ensure the progress of a country. Nevertheless, they were fundamental, it was just that other areas of knowledge were as important. In the search for the ideas to generate a shared symbol of Austrian society, Arnheim does not believe, as Ulrich does, that this symbol or symbols should be completely based on science and technology.

In his lecture of 1959, C.P. Snow wrote famously of two completely different cultures. In his essay *The Two Cultures,* based on the lecture, scientists and humanists could not communicate anymore. An ocean divided the ideas and beliefs of each group, and they were growing further apart. One of Snow's strongest arguments is that to corroborate his ideas, on one occasion he asked some of his colleagues if anybody could explain the Second Law of Thermodynamics. He remembers the answer was silence, although it seemed to him he was asking what in the humanities would be the equivalent of asking about Shakespeare. Another argument of Snow's on the recently created void between science and literature is that in the twentieth century writers, unlike what had happened in the past, would include very little of the scientific concepts and ideas in their projects. 'There was a time when 'refraction' kept cropping up in verse in a mystifying fashion, and when 'polarised light' was used as though writers were under the illusion that it was specially admirable kind of light.'[348] However, characters Musil was portraying in his novel, such as Arnheim and Ulrich, considered science and technology at the core of national development, Arnheim embracing both the artistic and the scientific, and Ulrich not.

On the other hand, Ulrich is not over impressed by Arnheim's way of thinking. He believes that Arnheim does not realize how science and technology are decisive for the progress of the country.

[348] Snow C.P. *The Two Cultures*. New York. Cambridge University Press. 1998. p. 16.

Ulrich thinks that it is an epoch of specialization, where there is no place for the interaction of different fields of knowledge because the accuracy and precision in the concepts you are dealing with would get lost. Arnheim seems to maintain the contribution science can give is of a superficial level, that specialization with it cannot contribute to the country as much as a layman, and this way of thinking deeply upsets Ulrich.

> "I'll tell you what I hold against him [Arnheim]," Ulrich persisted. "Scientific man is an entirely inescapable thing these days; we can't not want to know! And at no time has the difference between the expert's experience and that of the layman been as great as it is now. Everyone can see this in the ability of a masseur or a pianist. No one would send a horse to the races these days without special preparation.[349]

On one occasion, Arnheim responds to Ulrich, telling him a country cannot be run only by science and technology, the interests of a nation, the needs of a society, could not be developed in this way; it was an incomplete scheme.

> "…You demand that we live our lives in a scientific, experimental way," Arnheim said with energy and warmth. "You want responsible leaders to regard their job not as making history as a mandate to draw up reports on experiments as a basis for further experiments. A perfectly delightful idea, of course. But how do wars, and revolutions—for instance—fit in with that? Can you raise the dead when your experiment has been carried out off the schedule?"[350]

This is why the committee was formed with different characters to represent the most significant concerns of their society, Ulrich included as an adviser on science and mathematics and Arnheim as the visionary to give unity to the project, choosing the most representative fields of knowledge to show the magnificence of the culture. Of course, as a businessman he also had his own particular interests to guide his decisions.

In contrast to the opinions and thoughts of Ulrich and Arnheim on the topics of science and technology, there is another viewpoint, Count Leidorf's, the man in charge of the campaign, with a vision of science as a knowledge that has not been able to achieve what it promised. In *The Man Without Qualities*, some of the characters make an enormous contribution to our understanding of the place of science and technology at the beginning of the 20th century. The characters and their positions create one microcosm reflecting the principal attitude of the government towards science and technology, and a microcosm reproducing society's understanding of what science and technology was. How society understood science and technology and what was its impact, the repercussions it had on culture, is one of Musil's main topics.

Not only those taking part in the "Parallel Campaign" were concerned with what was happening over science and technology and their full inclusion in society. Bonadea, Ulrich's mistress, thought frequently about scientific themes. She could perceive the importance that science was acquiring in

---

[349] Musil. R. *The Man without Qualities*. *op cit*. p. 231, note 330.
[350] Ibid. p. 693.

her time, admiring the scientific and intellectual subjects talked about in the meetings she had with Diotima. Nevertheless, from her point of view they did not help to deal with her emotions.

Gerda also takes science into consideration for the creation of new values. Here Musil shows how it was common sense to give science an importance in the development of the country and its politics. Ulrich used to speak to Gerda, and his friend Hans Sepp, representing irrationalism, about the progress of areas such as science. When Ulrich speaks to them they both showed a deep interest and listened carefully to Ulrich:

> This is probably the most anachronistic attitude one can have nowadays, when intellectual rigor and emotional life are at the farthest remove from each other, but our precision in technology has unfortunately advanced to such a point that it seems to regard the imprecision of life as its proper complement.[351]

The 'intellectual rigor' and the 'emotional life' are the two sides that society was experiencing as approaches to understanding life. Two sides, which for some of the characters were not related to each other, with Ulrich thinking that if several fields of knowledge were mixed together then accuracy was lost, whereas others like Arnheim recognised the complementarily of both to help us understand natural phenomena.

4.1.3 *Musil's Ideas on the Interaction of Science and Technology with Society*

One constant characteristic of Musil's narrative is the inclusion of a scientific language for the description of the situations the characters are passing through. Musil uses words and concepts such as vibrations, mechanical, geometrically and correlations, to mention just a few, which belong to the sphere of science and technology, and employs them for the description of the feelings and the actions that the characters of *The Man without Qualities* are passing through.

What Musil wanted was to make the reader understand that these concepts, though used differently, can still be useful to other areas of knowledge due to the epistemological ground on which they are based. For example, Musil constantly used the magnetic field or other physical concepts to represent several social behaviours. In a sense by applying these concepts to the social sphere, Musil is showing a concern with the integration of science within the culture.

> We've known all that for a long time no, but we still prefer regard ourselves as the cause, the primal cause, in the magnetic fields of emotions around us...[352]

 The last paragraph relates to the concept of metaphor and its use within the narrative. In the narrator's perception a metaphor has two different but connected aspects, truth and untruth. If it is analysed rationally one is able to gain knowledge, but feelings are lost. Otherwise, taken as it is, art

---

[351] Ibid. p. 534.
[352] Ibid. p. 515.

and dreams can be built on a shaped reality. Musil used a metaphor to explain his idea of metaphor. His description of it is a set of meanings within a dream, which are directly related with the intuitions of religion and art. He constantly used the metaphor to relate human behaviour to science and technology, for example:

> "Up to now Agathe had been feeling perfectly comfortable between the joggings and joltings as the cab drove over bumpy suburban streets, leaving them incapable of speech, wrapped as they were in a network of mechanical vibrations..."[353]

In this paragraph the 'joggings and joltings' are exactly the same as to say 'network of mechanical vibrations', though they belong to the language of different fields of knowledge. They both represent the movement of the cab, although in the first case a more 'poetic' language is used, whereas in the second case a more 'engineering' language is used.

Musil links the humanities to scientific phenomena by the metaphor. This attempt should be taken seriously due to his engineering background, for he was not an amateur and did not have a merely cursory knowledge of concepts such as 'mechanical vibrations' or magnetic field. He could recognise the proximity of humanities and sciences via such concepts.

For the narrator, even religion was already permeated by science and its method. So maybe in the future a complementary knowledge between intelligence and mysticism would be possible. Ulrich believed these myths in his own particular arithmetical way, where his feelings could not be justified based on rational sense, except through the introduction of an imaginary hypothesis. Musil presented these ideas in Agathe, who says:

> You can be assured that in our day even most religious people are so infected with the scientific way of thinking that they don't trust themselves to look into what is burning in their inmost hearts but are always ready to speak of this ardor in medical terms as a mania, even though officially they take a different line!"[354]

The word 'infected' speaks volumes about how some of the characters, as already pointed out, thought of science and the 'scientific way', as such a strong influence on the understanding of life that even the most opposite activity, as religion could be, was also a participant in its method.

By the end of the novel the narrator remembers a method that can be applied to daily experiences for a 'successful reasoning' and although this method belongs to literature, it is very similar to the scientific method. According to the narrator, its creator was the English writer Surway:

> ...[Surway] distinguishes five such buttons in the process of successful reasoning: (a) close observation of an event, in which the observation immediately reveals problems of interpretation; (b) establishing such problems and defining them more narrowly; (c) hypothesis of a possible solution; (d) logically developing the consequences of this hypothesis and thereby to a successful outcome of the thinking

---

[353] Ibid. p. 793.
[354] Ibid. p. 833-834.

process.[355]

What Musil constantly pursues was a way to include science and technology in daily experiences. Sometimes the narrator elucidated an entire theory of possible comparisons, and sometimes the metaphor is his best way to relate science and technology with the common experiences of his characters.

In the thoughts and actions of the hero of his novel, Musil manages to show both positions. Ulrich was a seeker of comparative occurrences in the ambit of social relationships and physics, and constantly tries to show them to the other characters of the book. Musil shows the importance of using scientific and technological knowledge as well as the humanities for the description of one social phenomenon, or several. The integration of the scientific approach and the humanities approach give rise to a richer understanding. *The Man Without Qualities* constantly shows this integration in the different situations presented to the characters. Clear examples are:

> He once gave me a long talk about it: If you analyze a thousand people, you will find two dozen qualities, emotions, forms of development, types of structure and so on, which are what they all consist of. And if you do a chemical analysis of your body, all you get is water with a few dozen little heaps of matter swimming in it. The water rises inside us just as it does inside trees, and it forms the bodies of animals just as it forms the clouds. I think that's neatly put. But it doesn't help you to know what to say about yourself. Or what to do."[356]

> Or

> Constellations, bacteria, Balzac, Nietzsche whirled around in a vortex of ideas the point of which, as she sensed with growing clarity, was directed at certain differences—not considered a proper subject of conversation in those days—between her own body and that of the lieutenant. She was bewildered by his insistence on linking love with subjects that, as far as she knew, had never had anything to do with love.[357]

For Musil, science and mathematics are not being included in literature, though they are inherent to literature because a writer should be able to capture the characteristics of a certain era and science and mathematics are intrinsically linked to any period of time. What Musil achieved was to frame a 'scientific method' in fiction, although not so long ago the human activity nowadays known as science, had not yet appeared .

However, asking questions such as how did science arrive at its 'present state' shows some of his most radical thinking regarding science and technology. For him, the present state of science originates in Galileo and the mistake the church made when it merely threatened him, instead of executing him without so much publicity. From there on science and technology started to be grounded in 'matters of fact', the bases for a positivistic vision of the world. Although for Musil, the search for truth science was pursuing could not be achieved only by this discourse. In the

---

[355] Ibid. p. 1030.
[356] Ibid. p. 64.
[357] Ibid. p. 129.

section 'Science smiling into its beard, or a first full-dress encounter with Evil', Musil explains these intuitions.

4.2. *Robert Musil and the Concept of Acausality: Spengler, Mach, and Quantum Mechanics*

4.2.1. *The Decline of the West and The Man without Qualities*

> Walter was stymied; he groped, wavered. Suddenly he burst out: "He's a man without qualities!"
> "What is that?" Clarisse asked, giggling.
> "Nothing. That's just it, it's nothing."
> But Clarisse found the phrase intriguing.
> "There are millions of them nowadays," Walter declared. "It's the human type produced by our time!" He was pleased with the term he had hit upon so unexpectedly. As if he were starting a poem, he let the expression drive him on even before its meaning was clear to like a doctor, a businessman, a painter, or a diplomat?"
> "He's none of those," Clarisse said dryly.
> "Well, does he look like a mathematician?"[358]

Three recurrent topics are dealt with by the narrator and proclaimed by some of the characters: the decline of civilization, the "symbols" that can represent the "spirit" of the age, and the destiny of humanity. These three topics and their development are deeply related to each other.

The characters are immersed in an age of uncertainty and worry regarding the imminent future. The "Parallel Campaign" is formed to find the symbol or symbols to represent the age and in a way, address the decisions that the Austrian government should take to attenuate internal conflicts, with the idea of redirecting the entire nation towards hope for a better future. The main objective of the 'Parallel Campaign" was to get rid of the feeling of uncertainty enveloping society and change an unavoidable destiny. In a basic way, the three topics, in addition to being related to each other, are also related to Spengler's *The Decline of the West*.

The Decline of the West repeatedly deals with the difference between causality and destiny. For Spengler one difference between Faustian Culture (his term for western Culture) and Apollonian Culture (his term for Classical Culture) is the relationship between the concept of destiny and the principle of causality. Spengler wrote that in Classical Culture destiny was understood as a consequence of causal events, whereas in Faustian culture destiny is understood as a consequence of possibilities of events. According to Spengler the Faustian idea of destiny is grounded in a statistical notion:

> Statistics belong, like chronology, to the domain of the organic, to fluctuating Life, to Destiny and Incident and not to the world of laws and timeless causality. As everyone knows, statistics serve above all to characterize political and economic, that is, historical, developments. In the "classical" mechanics of

---

[358] Ibid. pp. 62-63.

Galileo and Newton there would have been no room for them.[359]

The notion of destiny generated by the possibility of events and not by causal connections is an idea Musil recurrently emphasised in *The Man without Qualities*.

Another idea relating to *The Decline of the West* is the role of science and technology within a culture. Spengler thinks that science, technology and even mathematics are cultural productions; that each culture is based on the idea of 'symbols'. For Spengler 'Number is the symbol of causal necessity'[360]. These symbols are inherent in every expression of culture, from mathematics and science to religion and the arts:

> Numbers belong exclusively to the domain of extension. But there are precisely as many possibilities – and therefore necessities—of ordered presentation of the extended as there are Cultures. Classical number is a thought-process dealing not with spatial relations but with visibly limitable and tangible units, and it follows naturally and necessarily that the Classical knows only the "natural" (positive and whole) numbers, which on the contrary play in our Western mathematics a quite undistinguished part in the midst of complex, hypercomplex, non-Archimedean and other number-systems. [361]

The idea of acausality Musil developed in his last novel runs in parallel, and could be taken as one of Spengler's symbols, of western culture, - those symbols at the core of a culture and which speak of the soul of the culture, of its deepest concerns and awareness regarding nature, concepts that mark the culture's main characteristics. These symbols dictate how science, technology, arts and creative activities in general, will be developed.

In Musil's book, the notion of acausality is developed from several points of view, one of them deeply grounded in Spengler's ideas. The noticeable parallels between Spengler's ideas and Musil's narrative collapse into the same main idea, the concept of acausality.

From his title, we may understand a concern of the time; the words Walter used to describe Ulrich, quoted at the beginning of this section, refer to a characteristic Musil wants to stress. The world Ulrich is living in is a world without characteristics, the personality of people has been lost, and this phenomenon has to do with the decadence of an era. As we have pointed out, the First World War is relevant here for the decadence attributed to the age, which the characters constantly refer to.

What Musil elucidates in his novel is an atmosphere full of questions without answers, a decadence of thought. And this feeling according to the narration was not a recent one, for even when Ulrich was studying to become a mathematician, the feeling of decadence could already be felt. Musil's constant emphasis on it may be directly connected with the First World War, for it has to be remembered that although the narrative is contextualised before this war, the book was written

---

[359] Spengler Oswald. *The Decline of the West: An Abridged Edition*. New York Oxford. Oxford University Press, 1991. p. 218.
[360] Spengler O. *op cit*. p. 43, note 359.
[361] Ibid. pp. 47-48.

after it, when it was commonly believed idea that Europe and its civilisation could not exist much longer due to the lack of love and faith humanity was generating. Everything was becoming more complex and less understandable.

The narrator explains that there was no answer for this feeling, no one could see beyond and analyze why humanity was immersed in this situation. It was a moment when the society was asking for a new way of life and of human expression. Perhaps the solution was in a new art, or maybe a new morality. Society did not have an answer, and nobody was happy about this but at the same time nobody was doing anything to change it. At a certain stage, it seems that the narrator ascribed this sickness, or the lack of a social 'spirit', to science and to the entities and concepts that it generated for the explanation of physical phenomena. However, as the book develops, the narrator remarks that science and technology had nothing to do with this problem, and at a certain level, it could be the development of these two knowledge areas that could help society to get out of its feelings of decadence.

> What can we do with all this spirit? It is constantly being spewed out in truly astronomical quantities on masses of paper, stone, and canvas, and just as ceaselessly consumed at a tremendous cost in nervous energy. But what becomes of it then? Does it vanish like a mirage? Does it dissolve into particles? Does it evade the earthly law of conservation? The motes of dust that sink and slowly settle down to rest inside us bear no relation to all that expense. Where has it gone, where and what is it? If we knew more about it there might be an awkward silence around this noun, "spirit."[362]

The narrator described the period as infected with "A Mysterious Malady of the Times", the title of one of the book's sections, where the narrator asks how it was possible to be immersed in that profound sensation of emptiness. He describes how the fault could not be ascribed to people or ideas, not even to a specific event or occurrence. Because talent existed, and although there were not so many, it was still possible to find strong personalities. The word used to describe the phenomenon is "missing", something in the air and in society in general was missing. Maybe some fundamental physical quality of human beings had changed, provoking this lack of imagination, of geniality. In the end the world would change perhaps for the better, or maybe for the worse. But it had to be accepted that a new era was coming, had perhaps already arrived and was planning to stay. As Diotima said: "The soul has gone out of society these days".[363]

These are the new men and women of the time, people without deep feelings, no longer concerned with the human condition. These are the men without qualities in a degenerate society. In the first part of the book the narrator emphasizes the description of this modern world:

> A world of qualities without a man has arisen, of experiences without a person who experiences them, and it almost looks as though ideally private experience is a thing of the past, and that the friendly burden of personal responsibility is to dissolve into a system of formulas of possible meanings. Probably the

---

[362] Musil. R. *op cit*. p. 161, note 330.
[363] Ibid. p. 111.

dissolution of the anthropocentric point of view, which for such a long time considered man to be at the center of the universe but which has been fading away for centuries, has finally arrived at the "I" itself, for the belief that the most important thing about experience is the experiencing, or of action the doing, is beginning to strike most people as naïve.[364]

And later on, this same feeling is recognised by some of the characters of the book, for example Arnheim proposes that only through human feelings could the decadent atmosphere be changed, only a different kind of man could end the contradictory condition of humanity.

"No one today knows the answer," Arnheim replied. "The problem of civilization can be solved only by the heart. By the appearance of a new type of man. By an inner vision and a pure will…"[365]

And later:

There is a nameless mood abroad in the world today, a feeling in the blood of more than a few people, an expectation of worse things to come, a readiness to riot, a mistrust of everything one reveres.[366]

The beginning is full of these passages where a decadent atmosphere prevails. However, there are also passages indicating that a new generation was appearing, eager to change the situation. The narrative indicates that suddenly something started to change, people stood up and understood that only they could change the decadent atmosphere. It was time for a new order and abandon the past, time for reform, and to generate a new wave of optimism. In a sense this was the purpose of the creation of the 'Parallel Campaign', to get rid of the pessimism. And what was starting to change was that:

Something went through the thicket of beliefs in those days like a single wind bending many trees—a spirit of heresy and reform, the blessed sense of an arising and going forth, a mini-renaissance and -reformation, such as only the best of times experience; whoever entered the world then felt, at the first corner, the breath of this spirit on his cheek.[367]

In his article "Spirit and Experience", published in 1921, Musil expressed some disagreements with *The Decline of the West*, thinking some of the ideas dangerous. His discussion on Spengler regards several themes, such as: the German political environment, the misplaced separation Spengler makes between *Geist* (spirit, mind, life) and *Verstand* (understanding, reason), Spengler's conception of intuition, and finally, his conception of the rise and collapse of a culture. Before this article, in notebook eight of his diaries, written around 1920, Musil had already expressed opinions on Spengler's *Decline*:

Culture: The phenomenon of the flowering and withering away of great cultures is unexplained. Therein Spengler has an excuse. The biological explanation, that an exhausted race attracts, not because it is so to varying racial mixtures as a carrier.[368]

---

[364] Ibid. p. 158-159.
[365] Ibid. p. 212.
[366] Ibid. p. 330.
[367] Ibid. p. 54.
[368] My translation. The original text says: 'Kultur: Das Phänomen des Aufblühens und Absterbens grosser Kulturen ist unaufgeklärt. Darin hat Spengler eine Entschuldigung. Die biologische Erklärung, dass sich eine

There seems to be no opposition to Spengler's cultural 'symbols'. Actually, as seen from the general ideas in *The Man Without Qualities*, Musil's notions on this are very similar to Spengler's.

One of the novel's main themes is the characters' pursuit of an idea to unify the culture of a nation. The idea of finding a common symbol for the Austrian Empire is often repeated in several passages, the idea of 'Symbols' beginning to emerge from the start. Diotima is one of the characters who first perceives the need for its creation:

> The thought of creating something with the resources of an empire and before the attentive eyes of the world, an embodiment of culture at its greatest or, more modestly circumscribed, perhaps something that would reveal the innermost being of Austrian culture—this thought moved Diotima as if the door to her salon had suddenly sprung open and the boundless ocean were lapping at her threshold like an extension of the floor.[369]

Ulrich also asks himself about the paralysis of society and culture, of course, still believing in a better future without being able to understand this paralysis. He wondered what was lost or missing, why the world was upside down. The genius of the previous period was gone, a new era was rising to replace the decline of the past.

The 'Parallel Campaign' comes to be the starting point for a new civilisation:

> When she spoke of symbols earlier in the meeting, she had naturally meant not soup kitchens but that nothing less was at stake than the need to recover that unity of mankind that had been lost because the disparity of interests in society had grown so great. The question arises whether at the present time the peoples of today are still at all capable of such great, unifying ideas? All the suggestions made so far were splendid, of course, but they diverged so widely…[370]

However, these ideas somehow had to be exploited, and their interaction with the sphere of power was important. As part of the 'Parallel Campaign', at a certain point Ulrich notices this need, and on hearing the conversation of other characters caught the phrase "bringing ideas into the spheres of power,"[371] which reflected the main interest of the government, to achieve not only the development of ideas but the development of ideas specifically able to somehow also benefit the nation. As the narrator sets it out, this was the main aspiration of the project.

Suddenly the idea takes on form and the 'Parallel Campaign' is convinced that the 'symbols' of the new era are the main target of the project, and the idea of 'symbols' is developed, relying on the spirit of Spengler's idea. Musil's idea of symbols and Spengler's can be seen to be similar:

> Their basic doctrinal device was the "symbol"; as far as Ulrich could make out, and he had, after all, some understanding of such things, what they meant by "symbol" was the great images of grace, which made everything that is confused and dwarfed in life, as Hans Sepp put it, cleat and great, images that suppress the noise of the senses and dip the forehead in streams of transcendence. Such symbols were the

Rasse erschöpft, zieht nicht, denn es handelt sich ja um veränderliche Rassenmischungen als Träger. It is written in the TAGENBUCH – Heft 8 Allgemeines [Um 1920]'. In *Robert Musil: Tagebücher, Aphorismen, Essays und Reden*. Herausgegeben von Adolf Frisé. Rowohlt Verlag, Hamburg. 1955. p. 243.

[369] Musil R. *op cit*. pp. 109-110, note 330.
[370] Ibid. p. 190.
[371] Ibid. p. 188.

Isenheim Altar, the Egyptian pyramids, and Novalis; Beethoven and Stefan George were acceptable approximations.[372]

By mentioning the Egyptian pyramids, Musil is using the same type of example Spengler used to describe the 'symbols' of a culture, definitely referring to Spengler's conception.

The idea of destiny in the novel may also be linked to Spengler's idea of destiny. This can be argued especially because Musil in his 1920 diaries mentioned Spengler in connection with it.

> Fate: destiny, time, direction, to Spengler forms a primary complex. The sensation directed by destiny, the virtual state of motion of each moment would be the element of living time. Past - Present - Future: secret of my future, I'm already there, it is a thing of the past? But I do not <<understand>>, I am only causally understood. Motive is not Cause, when time is metric time.[373]

Musil is here thinking about causality as a valid tool to understand the processes of action among human beings, although, as will be seen later, the principle of causality, or the reliability Musil ascribes to it at the beginning of the 1920s will change over the next few years.

Taking into account the ideas set out in the introduction and in the early part of this section regarding Spengler's ideas, though there are some similarities, there are crucial differences. For example, Musil believes in building a new era better than the past, and he would often strongly criticize Spengler, despite sharing some basic notions, strong proof of the latter being continuously found in *The Man without Qualities*. Due to all this, there were problems for his recognition as a great author:

> It was difficult to find an audience for a writer who had kind words for the Vienna Circle and Oswald Spengler, Peter Altenberg, and Georg Lukás; and Musil's critique of all forms of ideology was as unwelcome to most intellectuals as it was to the German middle class.[374]

Returning to the concept of causality, in the next section it will be seen that Musil's notion of it at the beginning of the 1920s is deeply related to Ernst Mach's. After the period in which Musil read Mach's theories his conception of it began to be included in his narrative.

4.2.2. *Mach, Musil, and the Concept of Causality*

The beginning of the twentieth century saw several academic changes in Musil's life. Later on, these changes will be deeply reflected in his career as a writer. However, the origins of his concerns as an engineer and the way he thought about how nature works will be a constant in his life and will

---

[372] Ibid. p. 338.

[373] My translation. The original text says: 'Schicksal: Schicksal, Zeit, Richtung nach Spengler bilden einen primären Komplex. Gefühl der eignen schicksalhaften Gerichtetheit, virtueller Bewegungszustand jeden Augenblicks wäre das Element der lebendingen Zeit. Vergangenheit -- Gegenwart -- Zukunft: Geheimnis meiner Zukunft; bin ich dort angelangt, gehört es der Vergangenheit an. Aber ich bin doch nicht zu <<verstehn>>, sondern nur kausal verständlich. Motiv wird nicht Causa, wenn Zeit metrische Zeit wird'. It is written in the TAGENBUCH – Heft 8 Allgemeines [Um 1920. *op cit*. p. 252, note 368.

[374] Luft, David S. *Robert Musil and the Crisis of European Culture 1880-1942*. Berkeley; London: University of California Press. 1980. P. 141-142.

be reflected through his books, especially in *The Man without Qualities*.

By the end of the 19th century (in 1898) Musil was starting his studies in mechanical engineering at the university of Brünn, taking some regular examinations in 1899 and in 1901. In these years he took courses mostly related to mathematics and physics, such as descriptive geometry, statics and mechanics, to mention a few. However, although the results of his exams were good enough to set out on a career and a promising future, he chose not to.

The technical institute in Stuttgart (the most sophisticated laboratory of mechanical engineering in Europe) offered Musil, partly through his achievements and partly through his connections, the position of assistant to Julius Carl von Bach. He rejected this offer, and when he finished his exams, started the obligatory year of military service. In November 1903 Musil left Stuttgart to go to Berlin, to the Friedrich Wilhelm University. In this institution, Musil was partly relating to subjects in the area of mathematics and physics, but his main subjects were philosophy and psychology. For a short time he came back to Brünn to present the Maturitätsprüfung exam, although from 1903 to 1908 he remained mostly in Berlin. Between the years 1903 and 1905 he definitely change his outlook on what he wanted to study. Although he was still writing and indeed publishing a couple of papers on mechanical engineering that helped him financially (also developing a machine for psychological experiments on light), he was already more interested in psychological phenomena than in physics. This was also the period when he started writing his first novel *Young Törless*. As can be seen, his interests gradually started to change.

From 1903 to 1908 Musil became acquainted with the knowledge theory and logic. The ideas of people such as Ernst Cassirer and Ludwig Klages were part of his studies, and among his professors were Wilhelm Dilthey and Georg Simmel. Experimental psychology strongly attracted him, and he studied it extensively. In this area two of the most important professors in Berlin were Alois Riehl and Carl Stumpf, and it was with the latter that he developed his research thesis in psychology with a major role for the philosophy of science. By February 1908 he had finished his dissertation and became a doctor in philosophy.

The combination he achieved between art and science was in no way a disadvantage for his narrative. Over the next few years he will develop a narrative addressing questions regarding the concept of acausality, of great importance for the science of the period. He started to use narrative and its power of explanation as a medium for the development of possible answers for those questions. His main idea in studying philosophy was to establish a connection between the arts and sciences; his goal was to achieve the use of a common knowledge that did not divide what science on the one hand could provide and on the other hand what the arts could provide for the understanding of the world. He had the intuition that not only science and technology were

necessary for the explanation of natural phenomena and human relations, thinking of narrative as a complementary field of knowledge. In this scheme philosophy played a major role, as the linking field of knowledge to help understanding of how science and technology were becoming part of society. To some extent in *The Man without Qualities*, the role of philosophy is to link narrative and science.

He got involved in philosophic discourse to develop a new philosophical theory for the 20th century, as a response to two main paths philosophy was following: Auguste Comte, his positivism and his scientism, and the 19th century philosophy against psychology. The philosophical discourse that was in tune with these two aspects was Ernst Mach's, Musil finding in his ideas what he was looking for.

Regarding the approach Musil was pursuing, more recently the figure of Snow and the two cultures debate is important. At the end of his essay *The Two Cultures*, Snow mentions the role of literary intellectuals in a culture. He outlines how without an approach to science and technology, non-scientific culture has no chance of getting closer to scientific and technological developments. And if literary intellectuals are not close to science and technology, then the entire culture suffers from an isolation of the scientific concepts and ideas. In this isolation, even though both communities share many patterns in the development of their work and search for ideas by similar approaches following common structures, scientists and artists remain in their own worlds and are unwilling to accept that a dialogue with the other culture could be very fruitful. This dialogue was already taking place in *The Man without Qualities* and has its origins in this period of time, when Musil understood the importance of science and technology as fields of knowledge that should be taken into account within narrative.

The doctoral degree Robert Musil obtained provided him with the means to deal with science with back up. In 1911 he decided he was an artist, but the previous years, especially those in which he was working on his doctoral degree, will radically changed his narrative.

The research he did in the philosophy of science marked a crucial stage in his life. For the following years, actually for his remaining years, it will make him constantly refer to Mach's philosophy for the development of his narrative. In fact, there is a question that can be identified in Musil's words that continuously disturbed the events taking place in his narrative, and deeply grounded in Mach's thoughts, i.e. can events be described as a part of patterns, or are they only chaotic actions which have no relationship to each other?

The history of Ernst Mach and Robert Musil begins in 1902, before Robert Musil went to Berlin and was still at Brünn, when he first read some of the popular scientific books of the physicist and psychologist. In his diaries, the first time Mach is mentioned is in notebook four on May 26, 1902:

Mach's populärwissenschaftliche Vorlesungen fielen mir heute zur rechten Zeit in die Hand, um mir das Vorhandensein einer vorwiegend verstandlichen Existenz von trotzdem hoher Bedeutung zu erweisen. Schlieβlich habe ich ja daran niegezweifelt -- aber ich erlaube mir, mich hiermit nochmals zur Vorsicht zu erinnern![375]

Musil's diaries show he admired Mach's intellect, he gave him back a trust in reason. In the same notebook later on he writes a list of Mach's books he had read or knew about, and the number is considerable. So by the time Musil was writing his dissertation in 1908 he was well acquainted with the popular scientific books of Mach, and with this dissertation he wanted to understand if Mach's positivist philosophy could be supported by the results given by the scientific methodology. The doctoral thesis was the perfect way he could deal with his concerns in psychology and philosophy, as well as the natural sciences. Mach was interested in the connections between science (in particular physics), psychology and the already established strong division between science and philosophy, exactly the concerns that occupied Musil in those years:

Carl Stumpf was the successor of the physicist Herman von Helmholtz, who in 1871 had made of Berlin the European centre of research in experimental physics. Stumpf was a well-known psychologist and was involved in projects such as the so called 'Tonpsychologie', whose main target was to interpret the sensations provoked in a human being by musical sound. He published a book in two volumes in this topic. For Musil, it seems that at a certain stage while he was studying in Berlin he worked in Stumpf's psychological institute. In this period he built the machine meant to be used in experimental psychology. At the university of Berlin the atmosphere was filled with a positivism, an established tradition which Stumpf was continuing. Musil, coming from the engineering area with a strong background in mathematics and physics, was perfectly suited to taking this positivist tradition into the sphere of philosophy. His generation of writers was part of this positivist tradition, built up by the scientists and philosophers of his age. In the social sphere, the Austrian mandarin is important for our understanding not only of Musil's positivist stance, but also of scientists and writers such as Mach, and Kafka for example.

Ernst Mach was a philosopher with the same scientific background as Musil's. He had Czech origins, and his work was mainly on physics and psychology. His popular scientific books were centred in the philosophy of science, Musil being deeply interested in themes Mach dealt with such as the principles of economics, the definitions ascribed by science to concepts such as mass and energy, and the principle of causality.

With the book *The Science of Mechanics* published in 1893, Mach provoked a re-consideration of the bases on which physics had been grounded: the Newtonian conception of how nature works and the Kantian interpretation that physics acquired in the 19th century.

---

[375] Musil, Robert. TAGENBUCH – Heft 4 (Brünn) 1898-1902. *op cit*. p. 37, note 368.

For Mach the scope of science was restricted to describing natural phenomena without being able to explain it. For him, natural laws arise as a consequence of tabular activities supported by catalogued facts. These different tabulations connect to each other in a functional way, function as defined in mathematics. From these relationships, a theoretical framework could be developed where theories come to be the connexions among the tabulations. The principle of causality had a role in this framework although its role was only theoretical and could not be ascribed to nature:

> In speaking of cause and effect we arbitrarily give relief to those elements to whose connection we have to attend in the reproduction of a fact in the respect in which it is important to us. There is no cause not effect in nature; nature has but an individual existence; nature simply *is*. Recurrences of like cases in which A is always connected with B, that is, like results under like circumstances, that is again, the essence of the connection of cause and effect, exist but in the abstraction which we perform for the purpose of mentally reproducing the facts. Let a fact become familiar, and we no longer requires this putting into relied of its connecting marks, our attention is no longer attracted to the new and surprising, and we cease to speak of cause and effect.[376]

Mach substituted the idea of cause and effect by the idea of functions, whose main purpose was only to relate the tabulations, but did not attribute causes to particular effects, and did not provide an explanation because Mach understood that 'nature simply is':

> It has simply been observed that the relations between the quantities investigated were similar to certain relations obtaining between familiar mathematical functions, and these *more familiar* ideas are employed as an easy means of supplementing experience. Natural phenomena whose relations are not similar to those of functions with which we are familiar, are at present very difficult to reconstruct.[377]

So for Mach the most important aspect of this theoretical framework was the representation of experience. However, returning to science, if this is not able to provide explanations of natural phenomena, then nor can causal explanations be achieved. Mach refuted the possible existence of causal connexions based on the idea that even though these connexions could exist, they would only be capable to link events without giving an explanation about them.

> The concept of cause is replaced there by the concept of function; the determining of the dependence of phenomena on one another, the economic exposition of actual facts, is proclaimed as the object, and physical concepts as a means to an end solely.[378]

According to Mach, if the scientific sphere gets rid of the principle of causality, then concepts such as thing and substance lose a considerable part of their significance. Furthermore, the advantage of getting rid of the concept of causality relies on the possibility of approaching the physical sphere with the psychology. For Mach, sensations in a physiological sense were the only meaningful phenomena that should be described because 'Properly speaking the world is not

---

[376] Mach Ernst. *The Science of Mechanics: A Critical and Historical Account of its Development*. Translated from the German by Thomas J. McCormack. The Open Court Publising Court Co. Chicago and London. 1960. p. 483.

[377] Mach Ernst. *The Science of Mechanics: A Critical and Historical Account of its Development. op cit.* p. 493, note 376.

[378] Ibid. p. 555.

composed of "things" as its elements, but of colours, tones, pressure, spaces, times, in short what we ordinarily call individual sensations."[379] Therefore, the Kantian distinction between noumenon and phenomenon can be avoided. The theory of sensations leads to a non-distinction between the physical and psychical phenomenon.

> As a science, experimental psychology tries to establish the causal connections underlying the manifestations of sensations. It thus aims at establishing laws to make outcomes predictable. That holds true even if we grant Mach everything that he had to say about the metaphysical implications of classical mechanics and his necessary substitution of functionalism for the classical concept of causality.[380]

In the end, for Mach the world could be framed by various connexions, with physics' focus on some connexions and psychology on others. The main difference between physics and psychology is the external viewpoint from which each of them specifically embraces natural phenomena.

> A body is a relatively constant sum of touch and sight sensations associated with the same space and time sensations. Mechanical principles, like that, for instance, of the mutually induced accelerations of two masses, give, either directly or indirectly, only some combination of touch, sight, light, and time sensations. They possess intelligible meaning only by virtue of the sensations they involve, the contents of which may of course be complicated…All physical knowledge can only mentally represent and anticipate compounds of those elements we call sensations.[381]

One of the central ideas in Mach's philosophy was that natural events were part of a holistic scheme that could not be accurately explained by the notion of causality. According to Mach, natural events could not be isolated from the entire network of happenings, and be explained by deterministic relations of cause and effect. In fact, this was one of Mach's principal arguments to exchange the notion of causality for the notion of function. As will be seen in the next section, the concept of acausality in Musil's narrative will also change the perception of realism, where the principle of causality was predominant, into a narrative that contemplates science and technology, and a more holistic vision of how events happened, where predictability could not be ascribed, was recognised.

Mach's idea of causality was widely held, but the atmosphere of the age believed that science could get rid of the notion of causality. The entire establishment of this notion could be said to be born in an English environment when Bertrand Russell published the paper 'On the Notion of Cause' between 1912 and 1913. It could be said that both, Mach and Russell, developed David Hume's position on causality further:

> One need only think of the problem of causality which has been important ever since Hume, for whom only the spatio-temporal connection between certain events was factually demonstrable; the necessity of the connexion and of whatever else belongs to the concept of causality is, according to Hume, something merely added by thought. Mach extends this Humean position to other physical concepts – mass, energy,

---

[379] Ibid. p. 483.

[380] Sebastian Thomas. *The Intersection of Science and Literature in Musil's The Man without Qualities.* Rochester, NY: Candem House. 2005. p. 22.

[381] Mach E. *op cit*. p. 506, note 376.

motion, temperature and quantity of heat amongst others. The everyday meanings of these concepts contain more than can be empirically demonstrated; the reasons for this are historical, psychological and economic.[382]

Musil did not share Mach's position on causality and in chapter 4 of his thesis criticized it, although he thought that physics should start explaining events not only in a reductionist perspective but also in a holistic one. He agreed with Mach that notions such as energy, thing and causality within certain phenomena should be interpreted differently and explained in new ways, more according to modern physics.

Some of the examples Mach used to exemplify his idea of functions among the physical phenomena were taken from thermodynamics. For example, if the temperature of a volume of gas is increased then the volume of the gas may vary. However, this doesn't necessarily happen the other way round, if the volume of a gas varies its temperature does not necessarily have to change. This example is what Mach called the '*counter*-phenomena'. In *The Science of Mechanics*, Mach also mentions Faraday's laws of induction as another case where the 'counter-phenomena' takes place.

> Care must, of course, be exercised, in such inversions, respecting the form of the dependence. Figure 235 will render clear how a perceptible alteration of α may always be produced by an alteration of λ, but a change of λ not necessarily by a change of α. The relations between electromagnetic and induction phenomena discovered by Faraday, are a good instance of this truth.[383]

The area of mathematics capable of framing this phenomenon is statistics. The relationship between temperature and pressure comes to be given by a functional relationship that describes the volume of the gas and has nothing to do with a measurement of time — time is a variable independent of the phenomenon — and nor with a certain defined cause.

To some extent, the idea of the probability that an event can happen was becoming common knowledge in society. One of the activities where this notion was recognised was in gambling. Back in 1866, John Venn in his book *The Logic of Chance* outlined:

> I would not for a moment underrate the practical dangers which are found to attend the practice of gambling. It is remarked that the gambler, if he continues to play for a long time, is under an almost irresistible impulse to increase his stakes, and so re-introduce the element of uncertainty. It is in fact this tendency to be thus led on, which makes the principal danger and mischief of the practice. Risk and uncertainty are still such normal characteristics of even civilized life, that the mere extension of such tendencies into new fields does not in itself offer any very alarming prospect.[384]

Venn, who was a logician and a mathematician, mentions the word uncertainty, considering it a characteristic of life. So it can be inferred that by the end of the nineteenth century the idea of uncertainty was a commonly held one.

---

[382] Musil Robert. *On Mach's Theories*. Introduction by G.H. von Wright. Translated from the German by Kevin Mulligan. Washington, D.C. : Catholic University of America Press: Philosophia Verlag. 1982. p.37-38.

[383] Mach E. *op cit*. p. 503, note 376.

[384] Otis Laura (ed). *Literature and Science in the Nineteenth Century: An Anthology*. Oxford University Press. Oxford. 2002. p. 29.

The idea of uncertainty is necessary to understand the notion of acausality, because if there is no clear certainty about what is provoking a natural phenomenon, then nor can a clear cause be identified. As will be seen in the subsequent sections, Musil introduced the concept of acausality in his narrative by grounding it on the notion of uncertainty, developing the idea that events do not have to have a defined cause.

Mach's concept of function perturbed Musil on a philosophical plane, as seen in his narrative. The world of his characters, especially those of *The Man without Qualities*, is a world where the notion of function is constantly present for the development of their actions.

In the thesis Musil wrote on Mach's interpretation of how science is structured, he had dual opinions regarding Mach's concept of function. By the mid part of his dissertation Musil seems to be in accordance with the usefulness of the concept of function.

> Without going into Mach's position on causality we can admit without further ado the comprehensive validity enjoyed by the concept of function on which Mach places so much emphasis. It is in fact a feature of every physical equation. It might be objected to the example brought forward, i.e. of Boyle's Law, that it expresses no causal connexion whatsoever but what, even on the ordinary view, is a simultaneous connexion, namely coexistence.[385]

This last word, 'coexistence', refers to how Mach's ideas (or at least what Musil thought of how Mach's ideas), interpreted events not in a linear flux of time where a determinant cause produced an effect, but of elements in nature that had a constant interaction and that in a simultaneous time defined the characteristics of a natural phenomenon.

One of the principal ideas of Musil's thesis was to show the strong relationship between the concept of function and the principle of causality. Furthermore, Musil's intention was to show how, even though Mach wanted to get rid of the principle of causality, within Mach's philosophical structure the principle was still present. It was inherent in the development of Mach's philosophy. Musil, by half way through the thesis, concedes that Mach's functions are important for modern physics and that concepts such as force and causality left in Mach's philosophy were at the core of scientific research:

> Let us summarize: We have already conceded that the concept of function is the real vehicle of modern physics; that the basis of concepts must be sought in experience; that the equations describing these experiences are first and foremost functional equations; and that we cannot ignore the fact that force, thing and causality occupy only a very unimportant position in scientific expositions or, at least in their original form, vanish completely.[386]

However, later on Musil will ask himself what contribution the notion of Mach's function made. He thinks Mach's interpretation of the relationship of natural laws is a logical relationship without the necessity of a cause. In his eyes, this view cannot be entirely complete because:

---

[385] Musil Robert. *On Mach's Theories*. *op cit*. p. 47, note 382.
[386] Ibid. p. 52.

… even the connexion expressed in a functional equation corresponds to a real dependence in nature and if the attempt to give the concepts of force, substance and causality a form which is based on such functional equations is successful the same will be true of these concepts.[387]

Mach considers that regularities in nature exist and that they provoke the necessity of laws. Thus, laws of physics can be determined. He also maintains that the predictability of events must be supported by the laws of nature and should naturally arise by the given regularities of the phenomena. If this happens, then the possibility of logical law-likeness connections can be derived from natural phenomena. For Musil, the way in which Mach is dealing with equations is very characteristic because it allows only a logical interaction among equations.

> He deals with equations as though they were merely aids to calculation, tools in the service of the economy of thought, and as we shall see more clearly in the next chapter, he deals with "merely logical" dependence as though it were something arbitrary. Concepts based on equations understood in this way do then of course appear to be without any objective foundation, mere temporary props to be put up and taken down as one thinks best. But to view matters in this way is to exaggerate the situation.[388]

In the fifth chapter of the thesis Musil argues that when Mach denies necessary connections then he is also denying the concept of function, because logical functions can only be justified on a material basis. According to Musil, if Mach denies necessary connections then he is also denying functions, and if the connections are established, then a principle of causality is still possible.

What Musil does in his thesis is to take for granted that the meaning of 'lawlike connections', which are the connections that take place within a theoretical framework among the mathematical elements that represent natural phenomena, mentioned by Mach, and the term 'necessary connections', which are indeed connections that take place in nature, is the same. However the term 'necessary connections' is out of Mach's theory development, and Musil did not give any explanation as to why he is considering these two ideas as the same. This might be a weak point in his refutation of Mach's philosophy. In chapter 3 Musil gives a sort of explanation for the equivalence:

> These remarks may mean that there is nothing in nature which corresponds adequately to our concept of necessity (a concept which, it should be added, is characteristic of inner perception alone and which, because of this, is a logical or psychological concept). This would mean that although we see connexions in nature which are as regular as necessary connexions would be, we lack any further insight into this natural necessity, every attempt to understand it is meaningless, especially if it means attempting to carry over just that concept of necessity which has its roots in our inner life.[389]

The editor of *On Mach's Theories* says the main problem of Musil's refutation of Mach's ideas is:

> Yet the question whether the notion of natural law involves the notion of natural necessitation is the very question at stake in the discussion. Mach denied this involvement. Musil simply assumes it. But thereby

---

[387] Ibid. p. 54.
[388] Ibid. p. 55.
[389] Ibid. p. 64.

he also begs the question – and his conclusion against Mach is a non sequitur.[390]

Mach had the idea that his concept of function could change scientists' strong belief in the principle of causality, but Musil in his thesis argues that the concept was in no way linked to philosophy nor that it would be able to re-direct the grounds physics was founded on. He also argued that some of the principal concepts of physics such as mass, time, and energy should in no way be linked with those of philosophy.

For Musil, as long as the possibility of establishing connections in nature existed, then it was a mistake to get a priori rid of possible answers such as the principle of causality; nonetheless, it could be perceived that the principle did not work for all natural phenomena. For Musil, to get a priori rid of this principle was a mistake Mach made, because science's main purpose was to establish connections that could be verified by evidence provided by various natural phenomena, which in the end could be translated into mathematics. Musil was confident that mathematics could represent natural phenomena whereas Mach was not; he thought mathematics only provided science with non-trustable connections. Later on in his life Musil will classify science as a kind of knowledge that belongs to the category of ratioïd. To Musil, 'ratioïd' refers to the practical knowledge that serves to understand reality where science can be included, whereas the 'non-ratioïd' was governed by the poet and his capacity to abstract what is not objective and has no well grounded bases.

By the end of his thesis Musil concludes that some of Mach's philosophical principles were deeply immersed in constant contradictions, that his idea of function was not so different from the principle of causality, or actually, that without this principle, Mach's idea of function could not be achieved because the idea itself was completely grounded in the principle of causality. By quoting and referring to some of Mach's major works, Musil shows how certain assumptions Mach made such as the necessity of relationships within a uniform environment, were directly pointing to the necessity of the concept of causality.

> Whatever the source of the denial of natural necessity, if Mach abandons it—and this was the second possibility we took as our hypothesis – the views described earlier lose their individual justification; laws will then no longer be mere tables; mathematical dependence can give way to the real dependence on which it is founded and economy of experience to inquiry; theoretical connexions can be more than ordering relations. Since there are two quite distinct types of law, physical and psychological, sensation and law can once again be distinguished; the separation of these two sorts of things, which are connected by relations of reciprocal, law-governed dependence, makes room once more for causality amongst other things and makes what Mach says on the matter wrong and misleading.[391]

Musil's idea about why the principle of causality was no longer at the core of modern physics was because the notion of a prime cause left physics without the possibility of describing complex

---

[390] Ibid. p. 13.
[391] Ibid. p. 80.

natural events. In his view, the concept of function was useful for the description of these events, but for more simple phenomena the principle of causality should still have an application. In the middle of his dissertation Musil outlined Mach's words which support the last paragraph:

> In these words of Mach's the result of the objections raised finds expression: relations which are incompletely analysed are causal relations, relations which are completely analysed are functional relations.[392]

In the end Musil concluded that Mach's functionalist viewpoint was in no way a menace to knowledge, especially to the already established path of science. Furthermore, it was an achievement for modern physics theories' development. The functionalist viewpoint outlined for quantum mechanics and Heisenberg's uncertainty principle does the same as at one time the principle of causality did for Newtonian physics. The concept of function and the principle of causality were in accordance with the main characteristic of science, which is to order relations and facts. Also, the purpose of science is to generate theories that can explain natural phenomena, so Mach's function theory was in no sense against science.

To understand the different positions of Musil and Mach, it is necessary to mention that they belonged to different philosophical traditions. In this period 'realism' and 'idealism', as well as 'phenomenology' and 'phenomenalism', were among the different options, and by the time Musil wrote his doctoral thesis he had taken a realist position on physics' philosophy, whereas Mach was more 'idealist'. This is the origin of Musil's confrontation with Mach's philosophy, because for Musil, in natural laws there must exist a physical necessity among the several phenomena, whereas for Mach, this necessity is only a logical one that enables their functionalism. However, this realist position will be confronted in *The Man without Qualities*, and as will be seen in the next section, the concept of acausality that he includes in his characters' world, will come to signify a confrontation with the realist science which he had agreed with while writing his dissertation.

One fundamental aspect of Musil and Mach's relationshipp is the figure of Carl Stumpf as Musil's tutor. Due to problems Musil had with Carl Stumpf there is a possibility that Musil's perception of Mach's theories was not entirely reflected in his thesis, especially because it is not known what the main modifications were that Stumpf had asked Musil to change.

At the time Musil wrote the thesis on Mach, there was a widespread reaction to Mach, supported by what at that time was called neo-Kantian perception. Musil's professors followed this tendency and constantly encouraged their students to write and criticize Mach following this ideology. As has been mentioned, one of the main disagreements between Musil and Mach was the term natural necessity and Stumpf also shared this disagreement, so it is very plausible that Musil had read, and

---

[392] Ibid. p. 47.

followed, Stumpf's criticisms.

> The letter above suggests that there may have been a break with Carl Stumpf. Was it intellectual or emotional? And if so what was it? It is also conceivable that Robert Musil was unhappy not just because the dissertation didn't entirely represent his own views, but that perhaps his own views were not themselves "clear and distinct".[393]

In Musil's diaries there is no detailed information about his feelings and ideas regarding Stumpf and the changes he had to make in his thesis, so it is not possible to completely frame this passage in the life of Musil. However, the book *The Science of Mechanics* is the only one of Mach's Musil referred to after he finished his dissertation.

With his thesis, Musil managed to prove that Mach's ideas had some weak points, especially in his attempt to get rid of causality, although he did not manage to give a full explanation of why it was not possible to get rid of it, he did not develop a theory that could support the principle of causality: perhaps he was not even interested in proving it.

After finishing his doctoral thesis, he was no longer involved in the discourse of the philosophy of science, at least not in a professional sense. In his diaries it appears that he just did not like science, despite loving it from when he was 18 until he was 31, although by 1911, as has already been said, Musil had decided to become an artist and put aside an engineering career.

> Nor did he seriously try to keep up with the breathtaking developments in theoretical physics, as some scholars suggest. Musil's understanding of the sciences is primarily informed by the debates that took place during the first decade of the twentieth century.[394]

Nevertheless, Mach's ideas deeply re-direct Musil's narrative. The material Musil wrote in subsequent years, and until his death, showed considerable interaction with Mach's ideas. Even in his novel *Young Törless* the interaction with Mach's ideas can already be seen, and Musil's first play *The Enthusiast* (published in 1911), deals with a notion that will be fully developed in his last novel *The Man without Qualities*. In these three main works there is a gradual development in the notion of acausality, which was profoundly linked with the notion of function that Mach had proposed, and that Musil never entirely discredited.

In the next section it will be seen that Spengler and Mach were two main figures providing Musil with the necessary background to develop the concept of acausality within his narrative, especially in *The Man Without Qualities*.

4.2.3 *Acausality and* The Man Without Qualities

Every possible move in every possible game is

---

[393] Imai Michio. *Musil between Mach and Stumpf.* In *Ernst Mach's Vienna 1895-1930: Or Phenomenalism as Philosophy of Science.* Edited by J. Blackmore, R. Itagaki and S. Tanaka. Dordrecht, The Netherlands. Kluwer Academic Publishers. p. 197.

[394] Sebastian Thomas. *op cit.* p. 11, note 380.

instantaneously present to the divine intellect. God knows the best of all possible worlds.[395]

The first novel Musil wrote was conceived in a difficult period of his life, due to the crisis in European society; it was written between 1902 and 1905. He started writing it in the winter of 1902, in Stuttgart, and when he arrived in Berlin, it became the main activity occupying his mind, so he rarely attended his courses. The novel tells the story about an Austrian mandarin and his youthful adventures.

One of the principal characteristics of the novel is the idea that young Törless, like all people searching for an identity, has to choose between several possibilities before clearly defining his own personality. His circumstances are those of a person who at a certain age, starting from a free will position, is able to decide his future; he has several opportunities to explore his capabilities and to become an individual. The idea Musil portrays in his novel regarding the definition of the personality is as part of a laboratory where several experiments are taking place, occupying as primary matter the concept of different possibilities, expressed with the term "Other Condition".

According to Yon Desportes, Musil's studies and readings of Ernst Mach were fundamental in the framing of the "Other Condition" idea. This idea is not part of Törless's secure and tangible world, it does not exist as part of his habitual atmosphere, but is part of another possible life. In Machian terms the idea of "Other Condition" can be reflected on a plane where ideas are the only existing entities.

In 1911 Musil will continue writing on the theme of possibilities, developing the relationship between the concept of possibility and the concept of causality and its decadence. In the two short stories published as *Unions* he will explore the relationships between the characters and will contemplate their possibilities of interaction. The stories' main purpose is to show how the characters arrive at a perception of others, and how the paths of each meet at a crossroads of circumstances.

At the same moment that Musil was writing *Unions* he also wrote for a journal where his ideas regarding literature and its main purpose were indicated. For Musil literature was a media where the logic of life could be used to analyse the various actions' possibilities and their production. Musil did not stop here, for actually this was only the beginning of a lifetime concern reflected in his art. He was starting to be involved in a narrative technique that quickly reflects one of the strongest leitmotifs in his work: acausality.

As his literary career progressed, each succeeding creation became a more refined exploration of the varying prospects for human experience, especially with respect to the problem of self-discovery and self-

---

[395] Musil Robert. *The Man without Qualities. op. cit.* p. 60, note 330.

definition. The postwar works reflect the author's ever-increasing interest in protagonists who have what he called a "sense of possibility." For Musil, this awareness of the unfixed nature of things sets the creative individual apart form the rest of the world.[396]

Musil's next work, his first play called *The Enthusiasts* or *Visionaries*, published in 1921, used the principle of variability for the development of the story. One of the characteristics of Musil's narrative from this work onwards was the creation of multiple stories, multiple bifurcations of the possibilities that were written as part of a process he developed before the decision of the actual story. In each of these multiple stories, three in *The Enthusiasts*, there is a strong relation between reality and possibility, between the actual facts and the possible facts. In the end he just used one of these multiple stories, but in the three of them, the same characters were immersed in different atmospheres as well as in different events.

What Musil explored in the portrait of Törless, he also applied to *The Enthusiasts*. The main idea was to portray multiple characters with a deep perception of their destiny, to lead the reader to understand that the destiny of the characters was in their own hands and that only they could modify it. As a consequence of this lack of direction within the narrative, a world is generated where each action can be seen as an input producing several different alternatives. Thus with each alternative chosen by the characters, a restructuring of their relationship with the world will take place. Clear causes and effects are therefore no part of the world of multiple possibilities conceived by the author. The principle of causality cannot be applied to this kind of narrative because the destiny of a character is not predicted from the beginning of the novel, the narrator does not anticipate how the narrative will evolve and the reader will have to wait until the characters choose their own faith, which will be reduced to only one possibility, though after a selection from various alternatives.

It seems that the purpose of stressing this idea is to convey that each action has specific repercussions. It may be thought that Musil was pointing to how the principle of causality could be fundamental for the explanations of events. However, there is also another meaning Musil pursued using this narrative methodology, closer to an acausal representation of events where the world is in constant movement and its flux does not allow one to point to a precise provoking one specific event, or events. Therefore not even the omnipresent narrator can predict the future, foreseeing what will happen in the end. The narrative evolves into a function of possibilities rather than an accurate and precise determination of the actions of the characters. The story even extends this feeling of uncertainty until the end, where the characters are still immersed in a world that can change in multiple ways. *The Enthusiasts* has no precise ending, and is immersed in an atmosphere that does not provide any define direction on how it could end.

The play divides into two groups of people, or at least, one of the characters, Thomas, divides it

---

[396] Bangerter, Lovell A. *Robert Musil*. New York. The Continuum Publishing Company. 1988. p. 59.

into two groups, between characters that live in a world of possibilities and are concerned with what might possibly happen, and the characters who live in a real world and just know exactly what is happening without having to ask what will be.[397] The characters that have an awareness of the possible future are those who can think about a re-direction of their movements, whereas the characters who live by the present seem to be just waiting for events to happen. Thomas belongs to the first group, and it is through his actions that the narrator emphasizes this quality.

In a sense the story of *The Enthusiasts* runs in parallel with certain positions beginning to be generated and adopted by the modern physics of the time, where observed phenomena could not be predicted until the very collapse of the wave function. In this collapse certain parameters, such as the energy of the system, are no longer possibilities and become actual values of the system observed by an external observer.

Physicists were occupied with the same phenomenon. In an attempt to clarify the notions contained in the theoretical framework of Quantum Mechanics, the German physicist Erwin Schrödinger exemplifies its implications with a theoretical experiment. Schrödinger said that if a cat is trapped within a poisoned room without any internal observer, then a prediction whether the cat is alive or dead cannot be made. So the only possibility to learn of the condition of the cat will be revealed only when the room is opened. As his biographer Bangerter mentions, this same phenomenon occurs in Musil's play:

> Anselm's ultimate exposure by the detective Stader is more than simply revelation of his lying and philandering. It is a total destruction of the world created by Anselm's sense of possibility, a world that has been so much a part of the lives of the others that its collapse signals a violent shattering of their illusions as well. Once that framework has been broken down, Anselm has no choice left but to return to mundane reality.[398]

One of the conclusions the narrative arrives at is to explain that circumstances cannot be predicted and the causes of events cannot be understood. *The Enthusiasts* is a play that leaves the door open to whatever may occur, starting without certainty and also finishing like that, there is no predictability for what will happen, no knowing. Nobody is wrong or right, and in the end, Musil leaves open the possibility for the public to imagine and decide which would be the best ending for the play, as he did not decide this.

Before naming the play *The Enthusiasts* Musil was also thinking of the title *The Anarchists*. This other title could have better represented the non-determining aspect Musil wanted to emphasize in

---

[397] The same division will be made in his next novel *The Man without Qualities* when the narrator says: 'Putting it another and perhaps better way, the man with an ordinary sense of reality is like a fish that nibbles at the hook but is unaware of the line, while the man with that sense of reality which can also be called a sense of possibility trawls a line through the water and has no idea whether there's any bait on it.' Robert Musil. *op cit.* p.12, note 330.

[398] Bangerter Lovell A. *op cit.* p. 67, note 396.

people's relationship to their possibilities and to modern society, in which these people are not welcome and supposedly should be outside it.

This spirit of uncertainty and possibility of action seen in and in part developed in *Young Törless*, *Unions* and *The Enthusiasts* will be fully reflected in Robert Musil's last novel *The Man without Qualities*, where the intuition of possibility is one of the main ideas that originated the full exploration in the concept of acausality in the narrative events. From the title it can be seen that Musil's main concern was to portray a man who in his free will condition had a broad scope of action.

When the Great War was over, Musil started to think about his next work, developing seven different ideas on what his next project would be. For a while he experimented with this material until he found the structure and the theme he was looking for. The second decade of the 20th century was the preparative period Musil had needed to understand the main argument of his next novel, the period when T*he Man without Qualities* was shaped. By 1926, the entire idea was formed and a certain advance allowed him to see the essence of the novel, although some of the topics had still not been contemplated.

One of the narrative strategies Musil employs concerns the way in which the subjunctive form of the verb is introduced to explain the events. This phenomenon cannot really be seen in the English translation although in its original form, it was a tactic that allowed the writer to emphasize his concern with the generation of possible situations. In a sense, what Musil does is to anticipate the possible but at the same time imminent future.

This narrative technique employed by the writer generates a parallelism between the hero of the book and the narrator regarding the possibility of coincidence that exists in the world. The narrative becomes a hypothesis of events that in a sense should become part of certain causes, although as will be seen, this was not Musil's final purpose. By using this narrative strategy Musil intended to pass from one possible event to other possible events and to generate an acausal understanding of the world.

The concepts of causality and acausality are deeply related to the idea that an event can probably occur. The way in which Musil relates statistical scientific discourse with language is based on a simile between this notion and the intuition of what could be probable. In Musil's diaries this simile can be seen, and in his novel, Ulrich developed a Möglichkeitssin, which means a sense of possibility.

He suspects that the given order of things is not as solid as it pretends to be; no thing, no self, no form, no principle, is safe, everything is undergoing an invisible but ceaseless transformation, the unsettled holds more of the future than the settled, and the present is nothing but a hypothesis that has not yet been

surmounted.[399]

Musil's novel is a critique of the principle of causality and the credibility of this concept at this time. In *The Man without Qualities*, the principle of causality is one of the topics Musil recurrently alludes to. Some of the main characters are in accordance with this principle and others are beginning an evolution in their thinking regarding this concept, and eventually entirely reject it. The development that the concept of causality was undergoing in this period is fully reflected in the narrative of Musil's book.

> "What we still refer to as a personal destiny," Ulrich said, "is being displaced by collective processes that can finally be expressed in statistical terms."[400]

The principle of causality and its abandonment by the physicists on the beginning of the 20th century goes in parallel with the recognition of destiny as a statistic event expressed by Musil in *The Man Without Qualities*. How can the dilemma of causality be represented in narrative? Of course in narrative the concept of causality-acausality will not be found in the same way that it is addressed in physics. The way in which Musil approaches art and science in his novel was to use the metaphor, with its power to represent the scientific understanding in the narrative through the world of the characters.

> The central stylistic problem was the sustained use of simile; this was the constitutive problem of Vereinigungen—the most extreme expression of Musil's understanding of metaphor as the key to art, as opposed to the unequivocal language of science. In *The perfecting of a Love* Musil employs the comparative constructions "like" or "as if" (wie, wie wenn, als ob) 337 times.[401]

In *The Man Without Qualities*, what we can find at first glace is a transitional position between causality and acausality perceptions of the world. It seems that when Musil started writing the novel he was convinced that causality could be a fundamental pillar for science as well as for narrative. Taking into account his thesis, Musil seems to accept the principle of causality. However, when the ideas Musil proposed are analyzed, it can be seen that what Musil developed in the novel was to employ what in logic is known as a 'Proof by Contradiction'. A 'Proof by Contradiction' is a mathematical resource that enables us to validate a proposition, if it can be shown that taking into account the proposition is false, it is possible to arrive at a contradiction.

Throughout the novel it can be seen that Musil was immersed in the recognition of acausality events, though some of the characters were still convinced that the principle of causality was important for science, for the understanding people could have of this world.

What is our place in the universe? The physical theories and the novels of the age were trying to answer the same question. Musil in his novel introduced science as a knowledge that could explain

---

[399] Musil R. *The Man without Qualities*. *op cit.* p. 269, note 330.
[400] Ibid. p. 785.
[401] Luft D. *op cit*. p. 93, note 374.

nature. He reflects a search in literary knowledge, physical knowledge and the knowledge these two can achieve together, his aim epistemological. He pursues a knowledge beyond these areas of study, where poetic and mathematical discourse could interact, to fully represent human feelings and how actions were developed by the characters within an acausal context.

His novel is the intersection of what in a certain moment of his life he called the 'ratioïd' and the 'non-ratioïd' knowledge. For Musil, literature meant the possibility to explore not only the rational sphere of knowledge where patterns and laws can be found but also to explore the other side, the irrational one, where questions have no definite answers and events cannot accurately be described by a causal and unique primary happening. Musil was a poet, including 'ratioïd' knowledge in literature, and this is one of the main achievements of *The Man without Qualities*.

In Musil's narrative there is no certainty where actions and causes can be precisely linked. The novel achieves a certain equilibrium between poetic and scientific language without giving more credit to one or the other.

> "We still say, nowadays, I love this woman, and I hate this man, instead of saying I find that person attractive or repellent. It would be a step closer to the truth to say that it is I, myself, who arouses in the other the capacity for attracting or repelling me, and even more accurate to say that the other somehow brings out in me the requisite qualities, and so on. We can never know where it begins; the whole thing is a functional interdependence, like the one between two bouncing balls or two electric circuits.[402]

The language achieved by Musil is a language that speaks about the world, which considers both fields of knowledge as necessary for the explanation of the world. This is one of the most evident interests of his last novel, to understand the importance of science and technology, but from a point of view which is not apart from other fields of knowledge such as philosophy and humanities in general. Arts and sciences have to be united to achieve a more complete treatment of human experience, Musil using his narrative to reflect this phenomenon. Furthermore, from the above quotation it can be seen that Musil is employing Mach's concept of function and is applying it to the explanation of human relationships.

The main target of the author is to unite arts and science into one single language that can explain what occurred to the characters. An atmosphere that wants to blame science for the suffering in society surrounds Ulrich. Most of the characters of the novel feel immersed in chaotic surroundings and they are desperately trying to find some sort of order. For them knowledge does not provide a safe ground. Yet as has been seen, Ulrich considers science a way to understand. In the case this area of knowledge is explored rightly, it can bring health to society and to his country.

We saw that Musil's doctoral thesis was on Mach's positivist epistemology, and that he was against Mach's ideas. By that time, Musil was impressed by the constraint the ideas of Einstein and

---

[402] Musil R. *The Man without Qualities*. *op cit.* p. 515, note 330.

quantum mechanics had achieved epistemologically, his interpretation being that there are limits on what is possible to be known. However, Musil did not accept Mach's conception of causality as a functional relation created by human psychology.

> For starters, the realist Musil was not prepared to accept Mach's view that the law of causality is something of a fiction, a conclusion imposed by the reductive view that laws are merely functional descriptions. Realism, and the world it wants, finds little support in the view that equations establishing relations between variables are an interesting, but non-necessary attribute of the perceiving mind. According to Mach, functional relations are simply relationships perceived between sensations; some are part of physics, some of psychology. This is not a dualism; it is a question of observational perspective. Much like his physicist contemporary Pierre Duhem, Mach believed that models are simply heuristic devices and have no logical necessity. In adopting Hume's critique of causality, Mach said that science portrays a world of arbitrary relations.
>
> Musil scoffed at the idea that one can live without causality.[403]

Thiher wrongly interpreted what Musil had set out in his thesis, because he never denied the possibility of acausality, what he did was to deny the method used by Mach to reach his conclusion. Although Allen Thiher shows Musil's causal preference concerning physics and its explanation of the world, another point of view has to be taken into account for Musil's perception of causality. Stephen Kern writes:

> In a dissertation on Ernst Mach written in 1908, Musil had argued that in the modern world causality is no longer deterministic but is rather a probabilistic functional relation that must be expressed with formulas. In the novel, Ulrich's friend Walter notes the multiplicity of causal forces that must be factored into such formulas."[404]

When he had finished his thesis and decided to become an artist, he started to experiment with the concept of causality and its scope. In a sense, he was continuously trapped between causality—because he wanted to live in a world where phenomena could be predicted—, and acausality—because he also understood the complexity for an event to be defined as an effect caused by one certain and only cause—. Here we see the interaction science and its ideas was causing within the narrative of the time. Einstein, Mach and Musil, like many other academics of the time, were concerned with the epistemological debate of causality.

4.2.4. *Quantum Mechanics and* The Man without Qualities

A man without qualities, without properties, refers to a critique of Mach's conception of science and the knowledge we can obtain from it. It is a critique of Mach and Poincaré on the conception that knowledge is obtained through the relation of things and is not inherent in things. For Mach a man without qualities could not exist, but for Musil Ulrich being a man without qualities was a man

---

[403] Thiher Allen. *Fiction refracts Science: Modernist writers from Proust to Borges*. United States of America. University of Missouri Press. 2005. p. 61.

[404] Kern Stephen, *A Cultural History of Causality: Science, Murder Novels, and Systems of Thought*. Princeton and Oxford. Princeton University Press. 2004. p. 261.

of infinite possibilities with all the consequences that this characteristic implied for the taking of decisions, or not.

For example in chapter 7, when three people in the street attack Ulrich (they beat him and rob him), this marks the phenomenon of multiple possibilities, an attitude characteristic of the indecision showed by the novel's hero when a certain event occurs and he is not able to be responsible for his actions, he just allows the actions to occur without trying to modify them. Here Ulrich, even though he was strong enough to beat the muggers, he just allows the action to happen without interfering. This scene is not only part of Ulrich's portrait as a man of possibility, but it is also an instance of one of Musil's leitmotifs.

Musil wanted science to be able to speak about the material world because he needed this knowledge for his novels to be developed. He wanted to find an explanation for the foundation of mathematics and also to understand how concepts that do not exist can turn out to give an interpretation of nature, for example imaginary numbers. Are science and mathematics able to explain the world or not? This is a question Musil himself asks. For him, if mathematics cannot explain the world, it is still a complex model of thought.

In 1913, Musil wrote an essay called "The mathematical man", where he spoke about mathematical foundations and their lack of solid ground, no matter that technology had been developed based on calculus. This contradiction left Musil wondering about the modern sciences and whether their epistemological ground was solid enough. The lack of foundations and also the well-supported asseverations on the negation of space and time, which is mentioned in his article, ends up with Musil awareness of Einstein's Theory of Special Relativity, ideas that began to shape his masterpiece and his conception of acausality within narrative as an explanation of the world.

In the first part of the novel the recognition of possible events arises as a metaphor used to explain moral events. Musil will give a very scientific explanation of how moral events are related to each other and to other events. He outlines the interdependence of these events in producing a function. But in the end this function will not be able to provide any solid ground for how events occur. Ulrich will then be defined as a container of possible virtues as well as vices and, regarding possibilities, his perception of what morality is will be compared to an atom:

> They [moral events] contain good and evil the way an atom contains the possibilities of certain chemical combinations. They are what they will become, so to speak; and just as the word "hard" denotes four entirely different essences, depending on whether it is connected with love, brutality, zeal, or discipline, the significance of all moral events seem to him to be the function of other events on which they depended. In this way an open-ended system of relationships arises, in which independent meanings, such as are ascribed to actions and qualities by way of a rough first approximation in ordinary life, no longer exist at all. What is seemingly solid in this system becomes a porous pretext for many possible meanings; the event occurring becomes a symbol of something that perhaps may not be happening but makes itself felt through the symbol; and man as the quintessence of his possibilities, potential man, the unwritten poem of existence, confronts man as recorded fact, as reality, as character. Accordingly, Ulrich felt that

he was basically capable of every virtue and every baseness; the fact that in a balanced social order virtues as well as vices are tacitly regarded as equally burdensome attested for him to what happens in nature generally, that every play of forces tends in time toward an average value and average condition, toward compromise and inertia. Ulrich regarded morality as it is commonly understood as nothing more than senile form of a system of energies that cannot be confused with what it originally was without losing ethical force.

It is possible that these views also reflected some uncertainty about life, but uncertainty is sometimes nothing more than mistrust of the usual certainties, and anyway, it is good to remember that even so experienced a person as mankind itself seems to act on quite similar principles. In the long run it revokes everything it has done, to replace it with something else; what it used to regard as a crime it regards as a virtue, and vice versa; it builds up impressive frameworks of meaningful connections among events, only to allow them to **collapse** after a few generations[405]

The second paragraph will link uncertainty as a stage of possibilities with the collapse of events where all these possibilities had become only one single and unique event. The word collapse is a word that Musil is fond of, and in the same period was at the core of quantum mechanics' theory. Then in the next lines Musil uses another two characteristic words relevant to the theory of quantum mechanics:

But the objection will be raised that this is a utopia. Of course it is. Utopias are much the same as possibilities; that a possibility is not a reality means nothing more than that the circumstances in which it is for the moment **entangled** prevent it from being realized—otherwise it would be only impossibility. If this possibility is **disentangled** from its restraints and allowed to develop, a utopia arises. It is like what happens when a scientist observes the change of an element within a compound and draws his conclusions. Utopia is the experiment in which the possible change of an element may be observed, along with the effects of such a change on the compound phenomenon we call life.[406]

It is true that Musil speaks about chemical events although what he is reflecting are the ideas that were the background to quantum mechanics and its development. The words collapse, entangled and disentangled are fundamental for the description of the development of the wave function.

Just before publishing the first part of his novel, Musil researched in the area of statistics, reading several books on the subject, an article by Erwin Schrödinger particularly capturing his attention, "Das Gesetz der Zufälle", which dealt with the laws of chance and was published in 1929. The article focuses on the statistical analysis that modern physicists were using to grasp the experiments on quantum phenomena, where random events become part of the basic notions that allows the development of natural laws. At the beginning of his novel Musil had seemed to have strong intuitions about a statistical conception of life, but with these readings he reinforced and redirected his literary efforts for the development of statistical theory. He introduced these mathematical concepts into the normal awareness of his character's experience:

"Look at this way, Gerda. Suppose the moral sphere works more or less like the physical, as suggested by the kinetic theory of gases, everything whirling around at random, each element doing what it will, but as soon as you work out rationally what is least likely to result from all this, that's precisely the result you

---

[405] Musil Robert. *The Man without Qualities*. *op cit*. pp. 270-271, note 330.
[406] Ibid. p. 265.

get!"[407]

It can be taken for granted Musil had already written his first chapters before reading Schrödinger's article, nevertheless this just emphasizes how interested was Musil in the laws of chance applied to society, especially to his character Ulrich. As it can be verified in his diaries, Musil had read Schrödinger's article in 1929, and extensively commented on it. What he wrote was a sort of prediction that he had imagined before:

> After the conclusion of the first volume of *The Man Without Qualities* I read in <<Die Koralle>> (diciembre 1929) a talk by Erwin Schrödinger, a member of the Prussian Academy of Sciences, about <<Das Gesetz der Zufälle>> [The law of cases]. As a result, the issue causal law or statistical law is now very present.[408]

In 1930, Musil published parts 1 and 2: "A sort of introduction" and "Pseudoreality Prevails". Then in 1933, he published 38 chapters of the second book "Into the millennium (The criminals)". In 1938 he was about to publish another 20 chapters, though in the end he decided not to, now Austria had become part of Hitler's empire, and he died in 1942.

This novel is an attempt to react against Nietzsche and Mach's epistemological framework and also a response to modern science, a response in the sense of including epistemological scientific grounds in historical and social processes.

> A property or quality –an Eigenschaft—in Musil's sense is an invariant trait, part of a recurrent constellation, that can be defined in itself as a positive trait that needs no other contrasting trait for definition.[409]

Musil tried to approach statistical laws to society by applying them to it. Is it possible to predict the behaviour of an entire society? In the story, there is an evident need to understand whether one can have a holistic vision of passing events rather than a reductive one. Perhaps the knowledge of totality is a utopia born of the statistical conception. However, for this purpose, Musil in Ulrich is interested in trespassing on various areas of knowledge; from mathematics, he used terms such as: representability, equal value, exchangeability, equality and undifferentiability. This idea is Spengler's representation of cultural mathematics where cultural knowledge becomes a holistic approach to knowledge.

> Ulrich's theory of representation also implies that modernity trades on the idea that anything can represent anything else.[410]

---

[407] Ibid. p. 535.

[408] My translation. In a translation to the italian from the original it says: 'Dopo la conclusione del I volume dell'Uomo senza qualità leggo in << Die Koralle>> (dicembre 1929) una chiacchierata di Erwin Schrödinger, membro dell'Accademia prussiana delle scienze, su <<Das Gesetz der Zufälle>> [La legge dei casi]. Ne risulta che la questione legge causale o legge statistica è ora assai attuale.' In Musil Robert. Diari: 1899-1941. a cura di Adolf Frise; introduzione e traduzione di Enrico De Angelis. - Torino : Einaudi. - v. Quaderno 8. 1980. p. 780.

[409] Kern S, *op. cit.* p. 85, note 404.

[410] Ibid. p. 97.

Related to Spengler, it seems Musil was referring to a man without qualities as a man not affected by or not interacting with his society, a man who did not have a direct relationship with his history. This can be inferred from information about Ulrich's life, such as about his education, although other aspects of his history, who his parents are, where he comes from, where he was born, are not mentioned. He seems to be a man without history, without causes indicating how he managed to become a mathematician of 32. That is, Musil treated acausality from several perspectives. For example, Ulrich is a character who does not have any well defined characteristics, no antecedents are the causes of his being, and he does not seem to have a history, or at least, Musil built a character without historical characteristics.

In this sense Ulrich is a statistical man not formed by causes, and although Musil had a strong attachment to the sense of destiny, just as Spengler had, he thinks that Spengler's idea about the relationship between history and destiny can be applied only to past civilisations such as the Greeks or the Middle Ages, due to the lack of information modern society had about them. However, if the analysis of the civilisation or a culture was carefully done, history came to be the result not of an unavoidable destiny or destinies but rather an outcome of the abstraction and induction that accidental events can provide. The result of Musil's idea of history is based on a world that behaves according to a complex and statistical system of relationships among the people of a culture.

> For Musil, history unveiled itself as a confused tangle of the external, accidental situation and whatever human beings happened to bring to bear on it, and he believed that very slight inward change in the European mentality might have sweeping consequences for the character of European social life.[411]

As Luft reminds us, Musil has a conception of destiny as born from a chaotic interaction of events, which might vary due to slight changes in the perception of societies. The people in charge of the 'Parallel Campaign" in *The Man without Qualities* are precisely looking for those ideas which might change the behaviour of a decadent society.

Another example of this acausal aspect is represented by the character of Moosbrugger. In the story, Ulrich's alter ego is a serial killer named Moosbrugger. This killer cannot comprehend why the judge (when he is being sentenced), associates the acts of the murder one to another. Kern explains in more detail this moment in Musil's story:

> "The judge's questions—such as "why did you wipe the blood off your hands?" and "Why did you throw the knife away?"—are intended to establish knowledge of right and wrong as a basis for a conviction. But while the judge sees those actions and Moosbrugger's guilt as a coherent whole, Moosbrugger sees them as "a series of completely separate incidents having nothing to do with one another, each of which had a different cause that lay outside [him]"."[412]

Thiher grasps the philosophical ideas behind science and mathematics from the beginning of the

---

[411] Luft D. *op cit*. p.152-153, note 374.
[412] Kern S. *op. cit.* p. 261-262, note 404.

20th century and their application to the narrative of the time. His analysis of Musil's epistemology is valuable to understand the concept of causality in the beginning of the century. However, Kern showed how Musil developed a concept on causality which went beyond the classical position, and just as happened to Einstein, he did not want to believe in a world where physical phenomena could not be predicted, although the outcomes of experiments and mathematics were dictating something else, and Musil was trying to adapt this to his narrative; the passage from causality to acausality is clearly represented on Musil's novel.

> "Yes of course we are!" Walter cried out. "You're not a creative man, after all, you've never learned what it means to 'express oneself,' which means first of all, for an artist, to understand something. The expression we impart to things is what I want, or someone else wants, by carrying it out! This is our living experience! Of course you'll say it's paradoxical, a confusion of cause and effect; you and your medical causality!"[413]

On April 15 1942 Musil was working for the last time on the novel, when at midday he would suffer a cerebral haemorrhage that killed him. His daughter Martha Musil will say later that Musil had sketched 20 different possibilities of the ongoing chapter that he was writing at that moment. Apparently even by the end of his life he had never decided how to finish his novel. This is a theme that still nowadays keeps scholars occupied.

The 20 different possibilities of how the chapter should end reveal an intention expressed in his narrative since *Young Törless*; that the actions achieved by the characters of the book are only decisions taken among various possibilities. The number of probable actions that the characters could follow was constantly addressed in his narrative, and we know about this concern because on the one hand in the *Man without Qualities* the inclusion of the probability that an event happens, is a constant topic, and on the other because of the multiple drafts he created for one particular chapter, even the one that he was developing before he died.

Furthermore, in the posthumous papers there are drafts and sketches which portray possible ideas for the last part of the novel. There are several positions on what the intentions of the author were regarding its end, but the truth is that Musil throughout his life showed several intentions materializing, all of them maintaining a comparable opportunity to become the end of the novel.

> Musil's death in 1942 bequeathed to the critics the author's own neurosis about how to finish the novel. One impulse has been to stress those indications that Musil meant to finish his novel essentially as he had conceived it in 1924. Another has been to emphasize his preoccupation with the issues of the second book and the extent to which these broke off from the original conception. The historical fact is simply that Musil never resolved this question himself. Here one is lead to the bottomless well of textual criticism or speculations on Musil's spiritual condition old age, but the preoccupation of the Musil literature with decisions Musil was unable to make himself overestimate the tragedy of his inability to finish the novel. Musil once remarked that he wanted to end the second book in the middle of a sentence with a comma, so

---

[413] Musil R. *The Man without Qualities*. *op cit.* p.1007, note 330.

that the novel would not appear finished and absolute, but this is a stressful vision for a critic.[414]

This aspect is important because Musil might have never decided on how to end the novel. He spent twenty years of his life writing it, so he had a long time to think about the end of the book and to decide on how to end it, and yet he did not. He preferred to continue developing possibilities for the ending until the very end of his own life.

In a certain sense, the novel ended exactly like his recurrent idea of an infinite number of possibilities. His idea of ending the parts of the book with a comma reflect what the destiny allotted Musil, an inconclusive novel perfectly in accordance with a life thought that materialized as an entangled novel, which had perhaps an infinite number of possibilities to be finished.

Conclusions

As has been seen, the concept of acausality in *The Man without Qualities* is the result of three different ideas that intersect at one single point. Musil's concern with including science and technology within his narrative is a constant need, as was the application of this knowledge to understand the human feelings of his characters. Some of the ideas of the philosophers Oswald Spengler and Ernst Mach were the fundamental basis for Musil's conception and recognition of acausality.

The recognition of this concept was not an easy task, when surrounded by a positivist atmosphere that wanted at all costs to preserve the principle of causality, and it took more than twenty years for Musil to understand how a novel should be structured to represent the acausality concept in literature.

For the development of his narrative, Robert Musil employed the combination of science and humanities as the epistemological ground to shape the thoughts of his characters. Ulrich, the man without qualities, as well as some of the other characters, is in part framed within a scientific and logical way of reasoning. This is the principal characteristic needed to acquire the idea of acausality because it was necessary to be in tune with the scientific and mathematical notions of the time such as statistics; the statistical discourse was fundamental to understand that events can also be thought of not only as the result of causal connections among events.

Musil would like to use science as the safe ground on which his narrative could be developed, that the laws of nature could entirely rule and describe the actions in Musil's narrative world. However, the author while developing the story recognises that notions such as destiny and causality do not have a precise definition within a world ruled by natural laws, he sees that even in narrative causality cannot explain the actions of his characters; that it is not worthwhile to try to

---

[414] Luft D. *op cit*. p. 213, note 374.

point to the causes that generate events.

On the one hand the figure of Oswald Spengler became important for Musil's novel because in *The Decline of the West* he reunited three ideas that for Musil's narrative will be fundamental: destiny, symbol and acausality. Musil's recognition of destiny in his novel comes to be the agglomeration of arbitrary events that cannot in any sense be determining for the future of a person. So the only scientific basis on which the idea can be founded is statistics, able to frame a possible result but not accurately point to it.

On the other hand, what Musil did in his doctoral thesis while criticizing Mach's philosophy pointed to the way he could deal with the idea of acausality in the narrative. Although he strongly criticized Mach's notions of the abolition of the principle of causality, in the end what he did was to contradict the way Mach was addressing his thoughts, discrediting the way Mach arrived at the conclusion of acausality, although Musil never argued against the possibility of acausality, indeed, what he criticized was the form but not the essence. In his thesis Musil never clearly took a position on the side of causality, actually there are several opportunities where Musil's strong affinities with Mach's way of thinking emerge. Furthermore, as already mentioned, the influence that the atmosphere and especially his tutor Carl Stumpf may have generated on Musil thesis results could be a determinant factor to strongly criticize Mach, even though he shared his principal ideas.

Later on, in *The Man without Qualities*, Musil used the concept of acausality to express his thoughts regarding what science and technology can tell us about the world. As has been seen, the characters of his last novel have different opinions on science and technology and their ability to describe every single aspect of life. By using the concept of acausality Musil makes a strong criticism of science and technology and the idea that they can give an explanation of natural phenomena and human behaviour. To Musil, for a more complete explanation the arts and humanities are as necessary as science and technology. Using the concept of acausality he illustrates that the realist position adopted by science and technology has its limits, because it is unable to determine the future of a person. Through his narrative he shows that cause and effect is a reductionist position that cannot provide what a holistic vision can.

Ulrich, the man without qualities is a man of infinite possibilities whose destiny will be determined by random events, and in which his present cannot be determined by causal relationships of the past, a man without qualities because he is an acausal man. As Musil continuously emphasized throughout the twenty years he was writing his novel, the end of the story could not be determined, his twenty different ideas for its end show he materialized the relationship on his ideas of possibility, destiny and acausality. The novel was not ended, leaving the reader the opportunity to decide its end, just as happened with the play *The Enthusiasts*.

Perhaps Musil never intended to finish the novel because that would mean to contradict the philosophy he generated in his life. As before had happened when he had mentioned the possibility of ending the second part of the book with a comma, the end of the book might have been destined to end like that. Perhaps Musil was in the middle of a very 'fine' sentence that morning of April 1942 before going to take a hot bath and die.

CONCLUSION

These four chapters are an attempt to outline firstly, the role some of the most important English and German literature from the beginning of the 20th century played in confronting concepts and ideas that were also part of the science and technology developments of the epoch, and secondly, what some of the innovations were that due to this confrontation came to be part of the narration of events.

James Joyce, Virginia Woolf, Thomas Mann and Robert Musil included in their narratives concepts that were becoming an integral part of western culture, and as was outlined in the general introduction, were part of the discourse of the scientific and technological improvements that took place by the end of the 19th century and the beginning of the 20th. The concepts of simultaneity, multiple points of view, relativity and causality were at the core of the technological and modern physics improvements of the period, and by the 1910s and 1920s came to be part also of the most important ideas and concerns that the novelists treated in their narrative.

The railroads, the global mapping of the world, the telegraph, the radio, Einstein's Relativity Theory, the new astronomical discoveries and Quantum Mechanics, were some of the technological and scientific developments that led the above mentioned concepts to become inherent to how Western society perceived its surroundings, and how human actions are developed in time and space. The German philosopher Oswald Spengler, a key figure for the German authors and for the understanding of these ideas, would denote these ideas as primary concepts of Faustian culture. These concepts were fundamental to how a certain culture would understand the world, part of a spatio-temporal awareness that was developed only from the 20th century. The repercussions of these notions creativity levels in many areas of study were one of the most important social phenomena of the beginning of the 20th century. At an artistic level, these concepts radically came to change previous notions of time and space.

The cultural movement of modernism, involving painters, writers and other artists, were the people whose work represented this new understanding that people had of space, the flux of time and causal events. The novelists of the age who were part of the modernist cultural movement, were some of the artists who had first understood the change of perception taking place and introduced it into the worlds they created with their narratives. As a consequence of this recent awareness, they developed narrative strategies able to embrace the representation of this new human consciousness. Their narrative came to consider how the actions that the characters developed were affected by these new conceptions and, by using narrative strategies hitherto unexplored, they led the reader to understand the new spatial and temporal implications that these concepts brought to the perception of an event.

Due to all these improvements and this new re-conceptualisation of time and space, the generation of authors born in the 1880s were immersed in a constant re-understanding of the world: the confines of space, the duration of events and the causes that could provoke an effect had to be re-conceived. Narrative, just as painting, music and the arts in general, was an area of creativeness where the authors could confront these recent concepts and their implications in the life of a human being.

The worlds the authors created were new worlds containing the ideas of simultaneity, multiple points of view, relativity and causality, and the fictional characters are characters that have to deal with a new environment. These concepts changed not only the experiences lived by the characters, but the way in which the reader could come to know the actions occurring in the narrative.

With the inclusion of these notions, in the case of Joyce and Woolf each character could contribute to an understanding of what was happening in an entire city at the same precise moment. In the case of Mann, the characters moved in a world where the concepts of space and time were no longer grounded either in a time marked by the hours of the day or in a finite space. Furthermore, in the case of Musil's novel the characters were not able to gain a clear understanding of whether the actions they developed could have direct repercussions on shaping the future, they reflected uncertainty. As a consequence of the various inclusions of concepts the reader has to penetrate this new understanding of an environment, of a way to perceive the world in accordance with new interpretations proclaimed by the science and supported by the technology of the time.

However, there are clear distinctions between the concepts that on the one hand the English language authors were concerned with, and on the other the German authors. On this topic a direct dependence on the surroundings in which the authors were born and lived their lives can be seen. As outlined, the first two chapters are focused on two writers with origins one in Ireland and the other in England, whereas the other two chapters are focused on two writers with origins one in Germany and the other in Austria.

Taking into account the information provided in the introduction, it is noticeable that the scientific and technological concepts embraced by the authors were directly linked with the science and the technology that was being developed in those countries. In the case of James Joyce and Virginia Woolf, both authors were concerned with cartographic discourse and the ideas of simultaneity and multiple points of view, at the core of the scientific and technological discourse of the British Empire which, by the end of the 19th century and beginning of the 20th century, was immersed in a politics of expansion and control. The main purpose of the British Empire was to control its colonies and to do this it needed to know what was going on in India as soon as possible. The role that the modern technology of the telegraph played to achieve this purpose was

fundamental, otherwise this control was impossible due to the long distances between the countries. For the British Empire, a map not only represented a geographical abstraction of the land, but also the purpose of the empire in terms of land domains to be exploited.

In the case of Thomas Mann and Robert Musil, they were concerned with the concepts of relativity and causality respectively, which were at the core of the German scientific discourse. On the one hand Einstein's Relativity Theory developed the concept of a relative time that varies due to the velocity of objects. On the other, the theoretical implications of the theory of Quantum Mechanics, which explains the behaviour of particles in certain experiments, developed among physicists the idea that the introduction of a notion of non-causal behaviour could be part of an explanation of the results of those experiments.

Both theories based their claims on the mathematical results obtained. However, as was said in the introduction, the case of the discourse of acausal events in nature went beyond the theoretical results that were being proclaimed by physicists of Weimar Culture. Because Germany had lost the war, society no longer trusted in science as a knowledge able to pronounce on nature with authority. So as Paul Foreman suggested, the crisis atmosphere pointed towards acausal events, and it surrounded the advances in physics, particularly Quantum Mechanics.

The Cases of James Joyce and Virginia Woolf.

James Joyce and Virginia Woolf were involved in the representation of Dublin and London respectively. Both had a notable interest in the discourse of cartography and in a sense, as was seen in the first two chapters, they both understood cartography and mapping as activities which needed to be considered from a scientific point of view.

In their narrative both sought to be as accurate as possible in the description of the places where the actions of their characters were taking place, they both wanted to accomplish a precision beyond the one hitherto achieved by narrative. So they embraced cartographic discourse not only as a geographical tool, but they also took into consideration notions that in the early 20th century were fundamental for the science and technology of the era, and for the perception that was being acquired by their culture regarding space and time.

Concepts such as simultaneity and multiple points of view are two concepts used by these two authors to reinforce the narration of situations, one of the fundamental aims they wished to achieve, a clearer perception of space and time where the actions of the characters were taking place. By including these two concepts within cartographic discourse they both provided the reader with a much more accurate vision of the events.

Finally, the intersection of the concepts of simultaneity and multiple points of view with the

discourse of cartography within narrative achieved a representation of the current space and time awareness of Western culture of the early decades of the 20th century as a new model of perception, closely related to the developments of science and the technology of the time.

From the first two chapters it can be seen how both authors were concerned with the cartographic discourse as a source, a tool to enable the authors to give a better explanation of the places, streets and spatial surroundings of Dublin and London. In both cases it was mentioned how their contact with cartographic discourse was not cursory, for they both, basing themselves on different notions—Joyce supported the development of the narrative and the description of the spatial places with maps of Dublin, and Virginia Woolf with astronomical discoveries and motor cars—used cartographic discourse and the ideas of simultaneity and multiple points of view for the same objective, a more realistic description. Both concepts were basic to their understanding of cartography and its relationship with space.

So the rapport they both had with cartographic discourse went beyond the representation of the geography of places. The inclusion of the ideas of simultaneity and multiple points of view in the description of places and surroundings reinforced the portrayal of the characters' actions, while moving through the city of Dublin and London. Both concepts, by the use of narrative strategies outlined in the two chapters, portrayed the characters' actions at several levels.

In the first place, both authors within a defined spatial surrounding managed to narrate the thoughts and actions of a particular character while he or she is engaged in a certain activity, such as walking. The second level involves again a defined spatial surrounding, although in this second level, through the narrative the reader learns the actions and thoughts of several characters, not just one. The third and last level deals with thoughts and actions of multiple characters situated in different spatial locations within both cities. This means that Joyce and Woolf narrated the actions not just of one character or of only one particular spatial location, but at the same time the thoughts and the actions of several characters, in different spatial locations within Dublin and London at the same precise moment.

Both James Joyce through *Ulysses* and Virginia Woolf through the narratives written between 1920 and 1930, developed within their work what I have called a 'spatio-temporal map', where by including the concepts of simultaneity and multiple points of view within the discourse of cartography, they achieved a more real representation of the characters' thoughts and actions as they moved through the spatial surroundings of Dublin and London.

There were many elements required for the recognition of these two concepts and for their development within the narrative of Joyce and Woolf. As was seen in the introduction, by the end of the 19th century and the beginning of the 20th, Europe was immersed in a techno-scientific

atmosphere where developments such as the telegraphic lines around the world and the railroads, were at the core of government concerns. The British Empire and its politics of conquest and control was dominant in this period. For the control of their colonies, especially India, the British government was concerned to reduce the time that information to indicate what was going on in India took to arrive to Britain. The more information the British government had of events occurring in India the more control it had over its colony. By the beginning of the 20th century England had built telegraph lines allowing maintenance of constant communication with almost the entire world. In the first decades of the 20th century the information arriving from the rest of the world already arrived in a few hours instead of days or months, as had happened before the creation of the telegraph lines. Within a city this technology allowed the transmission of information almost simultaneously. If from one side of the city a telegraph was send to the other side, it was just matter of minutes for the other side to receive the message and to answer it. As Peter Galison showed, a clear example of the use of the concept of simultaneity as commonly understood is reflected in the 1905 article of Albert Einstein (which was mentioned in the introduction and in chapter 3), when he used the concept to establish a way to measure time based on spatial references.

The telegraph also led to the possibility of thinking about the notion of multiple points of view, because being able to learn almost simultaneously what was happening on the other side of a particular city or thinking more broadly, in another part of the world, the concept by the first decades of the 20th century was already socially acquired, with recognition that there were various perspectives from which a specific situation could be considered.

For British people a map not only represented the space but the borders of conquest, for they were representations of the British Empire, its colonies and conquered lands. But the discourse of cartography for British culture did not end there. Towards the end of the 19th century a world reorganization was taking place where first, a complete representation of the earth was finally achieved, and second, a time-map was introduced in 1884 by situating Greenwich as the first meridian, from which the time will be counted.

James Joyce and Virginia Woolf were born when these social phenomena were reaching their peak. It was in their times that the telegraph was already a commonly used device, when the concepts of multiple points of view and simultaneity were being established and when the discourse of cartography and of the knowledge of what the earth was like, were widely diffused.

Furthermore, as has been seen, the techno-scientific atmosphere of England participated in our authors recognition of the notion of simultaneity and multiple points of view. Also, more directly, some intellectuals and new technologies helped Joyce and Woolf to recognize the above mentioned concepts as emerging notions that were part of the cultural environment, which needed a profound

evaluation of its effects on the life of a people. Both authors represented the consequences of the inclusion of these concepts into the culture; narrative is one medium where the various repercussions of simultaneity and multiple points of view within the continuum of space and time were represented.

In this thesis some of the various elements that were part of the acquisition of the concepts of simultaneity and different points of view by James Joyce and Virginia Woolf were outlined. Intellectual figures such as the mathematician Henri Poincaré and the philosopher Bertrand Russell played a theoretical role in the acquisition of the ideas of simultaneity and multiple points of view by English language authors James Joyce and Virginia Woolf, and both authors were in contact with them and to some extent the ideas of both intellectuals were being considered exactly at the time that both authors were developing their narratives.

In the case of James Joyce, in chapter 1, it has not been entirely determined whether he read one of Poincaré's most popular books, *Science and Hypothesis*. Nevertheless, many scholars have outlined the contact that he had with his ideas through perhaps a third person or reading material (like an encyclopaedia). Through some of the notes that Joyce took while he was writing the chapter 'Ithaca', he can be seen to be acquainted with ideas like simultaneity, multiple points of view and space that the mathematician had taken into consideration. Joyce's notes reflect an acquaintance with some of the most recurrent ideas set out in Poincare's book.

In the case of Virginia Woolf, in chapter 2, her relationship with Bertrand Russell was described, and how through her friend and painter Roger Fry, Woolf got in touch with some of the notions in Russell's theory like the concept of multiple points of view. In addition, it was outlined how Virginia Woolf got closer to the new concept of maps via the astronomical discoveries that were then being strongly publicised, and how the motor car was a new technology which helped her think of some new experiences people were able to feel through their contact with this technology, especially regarding the concept of map and the mapping of space.

In a sense, both authors embraced the scientific and technological discourse as sources of creativeness that provided notions which were fundamental to their narrative. As was shown in the first two chapters, in both cases there is no critique of these fields of knowledge, they do not question its limitations or the scope of science and technology. This is a considerable difference from Thomas Mann and Robert Musil.

The Case of Thomas Mann and Robert Musil

As was seen in the introduction, at the beginning of the 20th century Germany was one of the most highly developed countries for scientific structure and its relationship to industry and

government. This development, the inclusion of science within the social structure, provided culture with the necessary environment to enable it to think about concepts which had hitherto not been part of western culture.

The physics advances of the 19th century in scientific areas such as physics, particularly in the fields of electromagnetism, at the beginning of the 20th century saw the application of relevant ideas to the concepts of time and space and their relationship. After the 1905 article of Albert Einstein, the world would eventually come to learn of new possibilities when thinking about the space and time continuum, the flux of time, the relativity of time. A new theoretical framework had begun to be recognised as capable of describing micro events. The theory of quantum mechanics was about to be formalized and with it, the possibility of acausal events, although this recognition was not only conceived of from a theoretical point of view.

Germany was one of the principal nations contributing to scientific developments during the First World War. However, after their defeat, German culture was no longer so full of confidence in science as a source of knowledge, and an atmosphere of decline was generated regarding science and its power to describe nature, and in general, society was characterised by a feeling of decadence. With the publication of books such as *The Decline of the West* of Oswald Spengler, it can be seen that German culture of the beginning of the century was immersed in an atmosphere of decline. This atmosphere was part of a new way of thinking about how natural events develop; the generation of the idea of acausality within the theory of Quantum Mechanics was, as Paul Foreman outlined in his article, a response to several social phenomena occurring at this time.

The repercussions for the German cultural environment was noticeable in many fields of knowledge, and evident in science, art and literature. These areas of study, in part as a response to the multiplicity of political and social events, developed several concepts in different directions hitherto unexplored. In physics the relativity of time and the acausality of events were born at this time, and came to be fully embraced as possible ways of explaining natural phenomena.

Thomas Mann and Robert Musil explored some of the consequences that both concepts had not only on a natural level, but also in the perception that a human could develop by thinking in a world where a relative time and where acausal events could exist. The purpose of chapters 3 and 4, therefore, was to show how two novels from German culture, *The Magic Mountain* and *The Man without Qualities*, written in the context of changes in society from 1915 to 1930, were able to represent and explore common cultural ideas of the time, which in parallel were being manifested in the developments of areas such as physics.

Thomas Mann and Robert Musil, each of them in specific ways, were concerned with the inclusion of the concepts of relativity and acausality respectively within their narrative, at a time

when these two concepts were at the core of scientific developments and were becoming accepted by Western culture.

From the introduction it can be seen that at the beginning of the 20th century, German culture found in *The Decline of the West* social ideas representing feelings and concerns of the age. Spengler's notions on the role of ideas of primary significance that had only been developed by specific cultures, on the way in which a culture is organized, and how these ideas become manifest in different areas of human inquiry, help us understand how ideas of a relative time and acausal events could develop in Weimar culture.

Spengler was a major philosophical figure for German culture and his book was read and discussed by Thomas Mann and Robert Musil, who criticized it and reflected on its more relevant topics while they were occupied in the writing of *The Magic Mountain* and *The Man without Qualities*. In addition, Spengler's ideas were important for this thesis because it was taken as a symbol of what German society thought and believed in the early decades of the past century, and also because, even though almost a century has passed since its publication back in 1922, his ideas regarding 'symbols' belonging to particular cultures are still useful to understand the transmission of concepts from one cultural baggage to particular knowledge domains. So Spengler was very important for that generation of authors that had started thinking about new concepts generated in Faustian culture and even today, his ideas are useful to the analysis of these social processes. In a sense the ideas outlined by Spengler are represented in the narrative of Thomas Mann and Robert Musil, they were pioneers in developing of Spengler's ideas.

In chapter 3 the idea of a relative time in *The Magic Mountain* as one containing elements from various disciplines was outlined. It is consistent with the idea of a cultural concept, as described in Spengler's book. It is also consistent with the notion of dureé, developed by the French philosopher Henri Bergson. Most importantly, the idea of time in Mann's book seems to be confronting Einstein's measurement of time. By elaborating complex situations up on the mountain that the protagonist Hans Castorp experiences, Mann reflects on how impossible it is for human beings to measure the passage of time without the help of any mechanical device. For Thomas Mann, science based on human agreements was declaring that time can be measured, but for him time is not a concept that can be measured because each human being feels its passage differently; how people feel the flux of time will depend on the feelings and experiences that in a certain situation are passing through their mind and the body.

The figure of Hans Castorp, an engineer, a man of science, will be fundamental to the confrontation between art and science. As stated in the introduction, the first three decades of the 20th century were decades of transition, where new social figures such as scientists and engineers

were finding their feet in society, new social figures, where physicians were already established, able to intervene on natural phenomena, on the surrounding world. And it is with this character and in his conversations with other characters such as his cousin Joachim, Herr Settembrini and Naphta, that a confrontation between art and science on the nature of time and its ability to be measured was set out and analyzed.

Chapter 4 was dedicated to the development of the concept of acausality in the novel *The Man without Qualities*. It was shown that his conception of this idea was in accordance with the ideas of two very different intellectuals of the age, Oswald Spengler and Ernst Mach, and with the idea of acausality contained in Quantum Mechanics' theory.

Regarding Oswald Spengler, Robert Musil's novel constantly reflects the idea of the decline of culture. The objective of the characters, the principal purpose of the "Parallel Campaign", was the creation of a new concept, a new 'symbol' that could revive the negative atmosphere that in that moment could be felt in Austrian society, able to change the 'destiny' of the entire society. The concept of culture, symbol and destiny that Robert Musil uses are profoundly related to the same concepts Spengler used in his book. The three concepts, and what Oswald Spengler thought about them, as can be seen in Musil's diaries, allowed Musil to reflect on whether, in his time, a human being can be thought the causal consequence of a person's acts.

On the relationship between Spengler and Musil we can find more parallel ideas on the conception of culture, the symbols behind a culture, and the causality-acausality process. Musil's book can be said to be the narration of Spengler's ideas. The man without qualities described by Musil is an individual immersed in a society, sketched in accordance with Spengler's vision. Ulrich is able to understand this society through his being an individual without qualities. The "parallel campaign" is designed to find these symbols or as Spengler called it, the prime symbol of a culture. The campaign was not just meant to find the symbol but a representation of it, and Ulrich became one of the characters in charge of finding this symbol.

For Robert Musil, the figure of the physicist and philosopher Ernst Mach and his contributions to the philosophy of science was another source for the answer in his narrative to whether a human being can be thought as a causal consequence of his/her past acts. He wrote a doctorate on Ernst Mach and some of his philosophical ideas, and was particularly interested in Mach's idea about the principle of causality and his description of how to get rid of it within natural processes based on the concept of functions. Robert Musil in his thesis does not agree with the methodology used by Mach to arrive at such a statement. However, it cannot be taken for granted that the attack Musil made on Mach's theories was based on his own beliefs because Carl Stumpf, his doctorate advisor, shared an anti-Machian posture that was a common tendency at that time. The most relevant issue is

that after Musil's period of working with the work of Mach, when he wrote his doctoral thesis, he gradually adopted the position on acausal events (one of Mach's main ideas, part of his concept of function), and adapted it to his narrative.

After 1911, Robert Musil decided to become an artist and not keep going on the road to science. However, his work will have a strong link with Mach's ideas, particularly with the principle of causality and how this was changing. As has been seen, from *Young Törless* to *The Man without Qualities*, through the narration of the characters' experiences and their different perceptions, Musil confronted the concept of causality with that of acausality.

He treated the concept of acausality at various levels. The figure of Ulrich, the protagonist of Musil's last novel, as was shown, can be compared to the wave function, the principal equation that describes the behaviour of particles within the theory of quantum mechanics. Both of them, the equation and the character, are created and shaped respectively by statistical terms.

In *The Man without Qualities*' world, what Musil did was to create an atmosphere where some of the characters firmly believed in the principle of causality, but as is clearly exemplified by the non conclusion of the book, either because Musil died or because he did not have a clear idea how to conclude it, the world created by Musil was an acausal world, an entangled world. Musil succeeded in representing the positions of science, as in the case of quantum mechanics, and the stance of philosophy of science, as with Ernst Mach and his philosophy, predominant in the second and third decade of the 20th century, when the novel was written. By the end of the novel, and of his life, Robert Musil was convinced that a statistical approach to our understanding of natural events was the most accurate tool that had been generated so far, a recurring belief that is constantly manifest in his last novel.

The last two chapters of this thesis show how at the same time that the concepts of space and time were culturally re-conceptualised, Thomas Mann and Robert Musil were writing novels which also speak about the same concepts and their new conceptualisations. As can be seen in Mann's book, the relative time used by him and his conception of space were ideas which were being in parallel re-defined by the physicists of the time. On the other hand Spengler provides us with the necessary material to think about how this redefinition took place. The relationship between Mann and Spengler is important to understand how in the same epoch, the same feelings and awareness were taking place in society. Space and time redefinition into space-time continuum was not only a phenomenon within the physicists' community, they were a pair of symbols belonging to western culture and specifically German culture, re-defined in different fields of knowledge, even if each field adjusted the changes to their own interpretations.

The concept of crisis has been shown to be the departure point of these cultural changes. With

the example on the principle of causality and Spengler's book, it was shown how, through the redefinition of concepts, the interaction between science and society is formed. The physicists explored Spengler's book and found within it a tool to support the re-conceptualisation of the concept of causality.

The concept of causality links three areas of knowledge: physics, social behaviour and narrative, which underwent a process of causality-acausality re-conceptualisation, and the redefinition of these knowledge areas, of a common cultural symbol, was achieved due to an interaction among physicists, writers and philosophers such as Spengler.

Thomas Mann and Robert Musil sketched two men belonging to this epoch of transition; they pictured two scientific personalities in their books. Hans Castorp the engineer and Ulrich the mathematician are two inquirers who were formed as modern scientists with an analytical perception of life.

However, Mann and Musil had an entirely different approach to science and technology to that of Joyce and Woolf. Mann and Musil strongly criticized science and technology, Mann criticizing Einstein's departure point for relative time and Musil criticizing science as a field of knowledge able to describe every single aspect of nature, of the world and human beings. In chapter 4 it was emphasized how the character of Arnheim reflects the awareness that Musil was gaining.

It is not that both authors were totally hostile to science, because their narratives reflect a profound awareness of its importance, but both of them realize that to understand the world, at the same level of importance, arts and humanities play a crucial role. This is why Castorp and Ulrich, men of science and technology, by the end of the *The Magic Mountain* and *The Man without Qualities*, develop stances where for a better comprehension of natural phenomena, the arts and humanities have to be considered.

The role the four writers played in society was of cultural observers. They managed to portray, allowing the reader to visualize and understand, how the concepts of simultaneity, multiple points of view, relativity and acausality were related to this new conception, this new understanding of time and space that western culture was acquiring from the beginning of the 20th century.

The introduction of this thesis began by showing the Eiffel Tower as a symbol of technological and scientific improvement of western culture. Then the technological and scientific innovations of the period were outlined, and finally the last point of the introduction focused on showing how the writers of the epoch interpreted the new notions that these developments generated in the conception of time and space. The tower was not just the reflection of scientific and technological developments, it participated in the new notions of time and space that by the end of the 19th century society was acquiring and which up until the present day are taken as western society's

departure point for an understanding of how events happen in time and space.

Bibliography

[books, authored]

AFTALION Fred, 2001. *A History of the International Chemical Industry: From the "Early Days" to 2000*. Philadelphia. Chemical Heritage Foundation.

BANGERTER, Lovell A, 1988: *Robert Musil*. New York. The Continuum Publishing Company.

BANFIELD, Ann, 2000: *The Phantom Table: Woolf, Fry, Russell and the Epistemology of Modernism.* Cambridge. Cambridge University Press.

BEER, Gillian, 1996: *Virginia Woolf: The Common Ground*. Edinburg. Edinburg University Press.

BEUCHAMP, Ken, 2008. *History of Telegraphy*. London. The Institution of Engineering and Technology.

BIOGRAPHIQ, 2008. *Thomas Edison: life of an Electrifying Man* (Biography). Filiquarian Publishing. Biographic.

BOURGET, Paul, 1893: C*osmopolis*. Paris. Alphonse Lemerre.

BUDGEN, Frank, 1960: *James Joyce and the Making of the Ulysses*. Bloomington. Indiana University Press.

CASSIDY, David C., 2004: *Einstein and Our World*. New York. Humanity Books.

CHILDS Peter and FOWLER Roger, 2005. *The Routledge Dictionary of Literary Terms*. Abingdon. Routledge.

CONRAD, JOSEPH, 2007. *The Secret Agent*. Digisreads.com Publishing.

CUDDON John Anthony and PRESTON Claire, 1998. *A Dictionary of Literary Terms and Literary Theory*. Oxford. Blackwell Publisherd Ltd.

EDNEY, Matthew H., 1997: *Mapping an Empire: The Geographical Construction of British India, 1765-1843*. Chicago. University of Chicago.

ELLMAN, Richard, 1959: *James Joyce*. New York. Oxford University Press.

ELLMAN, Richard, 1972: *Ulysses on the Liffey*. New York. Oxford University Press.

GALISON, Peter, 1997: *Einstein's Clocks Poincaré Maps: Empires of Time*. New York. Norton & Co.

GAY, Peter, 2007: *Modernism The Lure of Heresy: From Baudelaire o Beckett and Beyond*. London. William Heinemann.

GAY, Peter, 1969: *Weimar Culture: The outsider as insider*. London. Martin Secker & Warburg Limited.
GILBERT, S., 1960: *James Joyce's Ulysses*. London. Faber and Faber.

GRODEN, Michael, 1977: *Ulysses in Progress*. Princeton N.J. Princeton University Press.

Hayles, N. Katherine, 1984: *The Cosmic Web: Scientific Field Models and Literary Strategies in the Twentieth Century*. Ithaca and London. Cornell University Press.

HEADRICK, Daniel, 1988: *Tentacles of Progress: Technology Transfer in the Age of Imperialism 1850-1940*. New York[etc]. Oxford University Press.

HOLLY, Henry, 2003: *Virginia Woolf and the Discourse of Science: The Aesthetic of Astronomy*. Cambridge.

Cambridge University Press.

HUURDEMAN, ANTON A, 2003. *The Worldwide History of Telecommunications*. Hoboken, New Jersey. John Wiley & Sons, Inc.

JONAS, Klaus W, 1955: *Fifty Years of Thomas Mann Studies*. Minneapolis. University of Minnesota Press.

JOYCE, James, 1985. *Ulysse*s, Gabler Ed. New York & London. Garland Publishing, Inc.

JOYCE, James, 2000: *Ulysse*s. London. Penguin Books.

KAVALOSKI, Joshua, 2004: *The Fourth Dimension: Time in the Modernist Novel*. Charlottesville. Va. Univ., Diss.

KERN, Stephen, 2004: *A Cultural History of Causality: Science, Murder Novels, and Systems of Thought*. Princeton and Oxford. Princeton University Press.

KERN, Stephen, 1983: *The Culture of Time and Space 1880 – 1918.* Cambridge, Massachusetts. Harvard University Press.

KENNER, Hugh, 1978: *Joyce's Voices.* London. Faber and Faber.

KING, James, 1994: *Virginia Woolf.* London. Penguin Books.

KRAGH Helge, 1999. *Quantum Generations: A History of Physics in the Twentieth Century*. New Jersey. Princeton University Press.

KUMAR, U., 1991: *The Joycean Labyrinth: Repetition, Time, and Tradition in* Ulysses. Oxford. Clarendon.

LAWRENCE, Karen, 1981: *The Odyssey of Style in* ULYSSES. Princeton, N.J. Princeton University Press.

LAWRENCE, D.H., 1981: *Women in Love.* Harlow. Longman.

LODGE, D., 1992: *The Art of Fiction.* London. Secker & Warburg.

LUFT, David S, 1980: *Robert Musil and the Crisis of European Culture 1880-1942*. Berkeley. University of California Press.

MACKEY, Peter Francis, 1999: *Chaos Theory and James Joyce's Everyman.* Florida. University Press of Florida.

MCHUGH, Ronald, 1976: *The Sigla of Finnegan's Wake*. London. Arnold.

MISA, Thomas J, 2004: *Leonardo to the Internet: Technology & Culture from the Renaissance to the Present*. Baltimore. John Hopkins Press.

MUSIL, Robert, 1955. *Robert Musil: Tagebücher, Aphorismen, Essays und Reden*. Hamburg. Rowohlt.

NORTH WHITEHEAD Alfred and RUSSELL, Bertrand, 1959-1960: *Principia Mathematica*. Cambridge. Cambridge University Press.

O'SHEA, Donald, 2007: *The Poincaré Conjecture: In Search of the Shape of the Universe*. London. Penguin Books.

RABATÉ, Jean Michel, 1991: *Joyce Upon the Void: The Genesis of Doubt*. New York. St. Martin.

RICE, Thomas Jackson, 1997: *Joyce, Chaos and Complexity*. Illinois. University of Illinois.

R<small>OSS</small> Stewart, 2008. *The Industrial Revolution*. London. Evans Brothers Limited.

S<small>ARKAR</small> Tapan K. 2006. *History of Wireless*. New Jersey. John Wiley and Sons Inc.

S<small>EBASTIAN</small>, Thomas, 2005: *The Intersection of Science and Literature in Musil's The Man without Qualities*. Rochester, NY. Candem House.

S<small>EIDEL</small>, Michael, 1976: *Epic Geography: James Joyce's Ulysses*, Princeton NJ. Princeton University Press.

S<small>IMPSON</small> J.A. and W<small>EINER</small> E.S.C., 1989. *The Oxford English Dictionary*. Second Edition. XI. Oxford. Clarendon.

S<small>INCLAIR</small>, Julie L. 2004. *Great Inventions: The Automobile*. Minnesota. Capstone Press.

S<small>NOW</small>, C.P. 1998. *The Two Cultures*. New York. Cambridge University Press.

S<small>TEWART</small>, Ian, 2007: *Why Beauty is Truth? A History of Symmetry*. New York. Basic Books.

T<small>HACKER</small>, Andrew, 2003: *Moving through Modernity: Space and Geography in Modernism*. Machester. Manchester University Press.

T<small>HEALL</small>, Donald F, 1995: *Beyond the Word: Reconstructing Sense in the Joyce Era of Technology, Culture, and Communication*. Toronto. University Press of Toronto.

T<small>HIHER</small>, Allen, 2005: *Fiction Refracts Science*. Columbia. University of Missouri Press.

T<small>HROWER</small>, N. J.W, 2007: *Maps and Civilization: Cartography in Culture and Society*. Chicago. The University of Chicago Press.

W<small>ALTER</small> Hugo G, 1999: *Space and Time on The Magic Mountain: Studies in Nineteenth and Early-Twentieth Century European Literature*. New York. Peter Lang Publishing.

W<small>ARD</small>, Janet, 2001: *Weimar Surfaces: Urban Visual Culture in 1920's Germany*. London and Los Angeles. University of California Press.

W<small>EGENER</small>, P<small>ETER</small> P., 1997. *What makes Airplanes Fly: History, Science and Applications of Aerodynamics*. New York. Springer-Verlag Inc.

W<small>HITWORTH</small>, Michael H., 2001: *Einstein's Wake: Relativity, Metaphor, and Modern Literature*. Oxford. Oxford University Press.

W<small>OOLF</small>, Virginia, 2003. *A Haunted House: The Complete Shorter Fiction*. Vintage Classics.

W<small>OOLF</small>, Virginia, 1992: *A Room of One's Own*. Oxford. Oxford University Press.

W<small>OOLF</small>, Virginia, 1992: J*acob's Room*. London. Penguin Books.

W<small>OOLF</small>, Virginia, 2000: *Mrs Dalloway*. Introduction by Elaine Showalter. London. Penguin Books.

W<small>OOLF</small>, Virginia, 2000: *The Waves*. London. Penguin Modern Classics.

W<small>OOLF</small>, Virginia, 2008. *To the Lighthouse*. Oxford. Oxford University Press.

[books, edited]

B<small>ELL</small>, Anne Olivier, ed, 1977: *The Diary of Virginia Woolf: Volume 1. 1915-1919*. London: The Hogarth Press.

BELL, Anne Olivier, ed, 1978: *The Diary of Virginia Woolf: Volume 2. 1920-1924*. London: The Hogarth Press.

BELL, Anne Olivier, ed, 1980: *The Diary of Virginia Woolf: Volume 3. 1925-1930*. London: The Hogarth Press.

HERRING, Phillip F., ed, 1977: *Joyce's Notes and Early Drafts for Ulysses: Selection from the Buffalo Collection*. Charlottesville. The University Press of Virginia.

HERRING, Phillip F., ed, 1972: *Joyce's Ulysses Notesheets in the British Museum*. Charlottesville. The University Press of Virginia.

LIGHTMAN, Allan, ed, 2005: *The Discoveries*. Vintage Books. 2005.

MATTER, Harry, ed, 1986. *Aufsatze Reden Essays (Thomas Mann)*. Band 3 1919-1925. Berlin. Aufbau-Verlag.

NICOLSON, Nigel, ed, 1976: *The Letters of Virginia Woolf*. Volume 2, 1912-1922. London: The Hogarth Press.

NICOLSON, Nigel, ed, 1976: *The Letters of Virginia Woolf*. Volume 3, 1923-1928. London: The Hogarth Press.

NICOLSON, Nigel, ed, 1978: *The Letters of Virginia Woolf*. Volume 4, 1929-1931. London: The Hogarth Press.

OTIS, Laura, ed, 2002: *Literature and Science in the Nineteenth Century: An Anthology*. Oxford. Oxford University Press.

ROSE J. HOLLAND, NEWTON A.P., BENIANS E.A. (eds), 1929-1936. *The Cambridge History of the British Empire. Vol. 2. The Growth of the New Empire*. Cambridge: Cambridge University Press.

STUART, Gilbert, ed, 1957: *Letters of James Joyce*. London. Faber and Faber.

[translated books]

EINSTEIN, Albert, 1905: "Zur Elektrodynamik bewegter Körper", Annalen der Physik 17: 891; English transl. 'On the Electrodynamics of Moving Bodies'. (George Barker Jeffery and Wilfrid Perrett, transl.), 1923. Another English transl. 'On the Electrodynamics of Moving Bodies' by Megh Nad Saha (1920).

GUSTAVE, Flaubert, 1979: *Madame Bovary*. Paris. Flammarion. Engl. transl. *Madame Bovary*. Forgotten Books. 2008.

KURZKE, Hermann, 1999: *Thomas Mann, Das Leben Als Kunstwerk: Eine Biographie*. München. C.H. Beck. Engl. transl. *Thomas Mann, Man as a Work of Art: A Biography*. (Leslie Willson, transl.) Princeton University Press, 2002.

MACH Ernst, 1897: *Die Mechanik in ihrer Entwicklung*. Brockhaus. Leipzig. Engl. Transl. *The Science of Mechanics: A Critical and Historical Account of its Development*. (Thomas J. McCormack, transl.) The Open Court Publising Court Co. Chicago and London. 1960.

MANN, Thomas, 1967: *Der Zauberberg*. Frankfurt am Main. Fischer Taschenbuch Verlag. Engl. transl. *The Magic Mountain*. (John E. Woods, transl.) New York. Vintage Edition, 1996. Also used in this thesis *The Magic Mountain*. (H.T. Lowe-Porter transl.) Secker and Warburg. London, 1965.

MUSIL Robert. *Diari: 1899-1941.* a cura di Adolf Frise ; introduzione e traduzione di Enrico De Angelis. - Torino : Einaudi. - v. Quaderno 8.

MUSIL, Robert, 1983: *Beiträge zur Beurteilung der Lehren Machs.* Hamburg. Rowohlt. Engl. transl. *On Mach's Theories*. Introduction by G.H. von Wright. (Kevin Mulligan, transl.) Washington, D.C. Catholic University of America Press: Philosophia Verlag, 1982.

MUSIL, Robert, 1952: *Der Mann ohne Eigenschaften.* Hamburg. Rowohlt. Engl. transl. *The Man Without Qualities*. Great Britain. Picador, 1997.

POINCARÉ, Henri, 1908: *La Science et l'Hypothèse*. Paris. Flammarion. Engl. transl. *Science and Hypothesis*. New York: Dover Publications, Inc., 1952.

SPENGLER, Oswald, 1969: *Der Untergang des Abenlandes*. München. C.H. Beck. Engl. transl. *The Decline of the West*: *An Abridged Edition*. New York Oxford. Oxford University Press, 1991.

WINSTON, Richard and Clara, eds, 1971: *Letters (of Thomas Mann), 1889-1955*. New York. Knopf.

[chapters in books]

BEER, Gillian, 1996: ''Wireless': Popular Physics, Radio and Modernism'. In *Cultural Babbage: Time, Technology, and Invention*. Ed. Francis Spufford and Jennifer S. Uglow. London. Faber.

BISHOP, John, 1999: 'A Metaphysics of coitus in 'Nausicaa''. In *Ulysses En-gendered Perspectives* Edited by Kimberly J. Devlin and Marilyn Reizbaum. Columbia, South Carolina. University of South Carolina.

EDGERTON D.E.H, 1996. 'British Scientific Intellectuals and the Relations of Science, Technology and War'. In *National Military Establishments and the Advancement of Science and Technology*. Paul Forman & José M. Sánchez-Ron Ed. Dordrecht; Boston; London. Kluwer Academic Publishers.

EINSTEIN, Albert, 1905. 'On the Electrodynamics of Moving Bodies'. In *The Discoveries*. Vintage. 2005.

ELIOT, T.S., 1919: 'Tradition and the Individual Talent'." In *Selected Essays*. London. Faber & Faber. 1976

ELIOT, T.S., 1923: 'Ulysses, Order and Chaos*'*. In *Selected Prose of T.S. Eliot*, edited by Frank Kermode. London. Faber and Faber, 1975.

FLETCHER, John and BRADBURY, Malcolm, 1976: 'The Introverted Novel'. In *Modernism: A guide to European Literature 1890-1930*. Ed. by Malcolm Bradbury and James McFarlane. London. Penguin Books.

HART, Clive, 1974: 'Wandering Rocks'. In *James Joyce's Ulysses: Critical Essays*. Ed. by Clive Hart and David Hayman. Ltd. Berkley; London. University of California Press.

HAUSMAN, Alan, 1976: 'Non-Euclidean geometry and relative consistency proofs'. In *Motion and Time, Space and Matter: Interrelations in the History of Philosophy and Science*. Edited by Peter K. Machamer and Robert G. Turnbull. Ohio. Ohio State University Press.

HENRY, Holly, 2000: 'From Edwin Hubble's Telescope to Virginia Woolf's "Searchlight"'. In *Virginia Woolf in the Age of Mechanical Reproduction*. Edited by Pamela L. Caughie. New York; London. Garland Publishing.

IMAI, Michio, 2001: 'Musil between Mach and Stumpf'. In *Ernst Mach's Vienna 1895-1930: Or Phenomenalism as Philosophy of Science*. Ed. by J. Blackmore, R. Itagaki and S. Tanaka. Dordrecht. Kluwer Academic Publishers.

KRISTEVA, JULIA, 2004. 'Proust and Time Embodied.' In *Marcel Proust*. Broomall, P.A. Chelsea House Publishing.

NICHOLLS Roger A, 1985: *Thomas Mann and Spengler*. In *The German Quarterly*, Vol. 58, No 3 (Summer), pp. 361-374. Blackwell Publishing on behalf of the American Association of Teachers of German.

MCFARLANE, James, 1976: 'The Mind of Modernism'. In *Modernism: A guide to European Literature 1890-1930*. Edited by Malcolm Bradbury and James McFarlane. London. Penguin Books.

MINOW-PINKNEY, Makiko, 2000: 'Virginia Woolf and the Age of Motor Cars'. In *Virginia Woolf in the Age of Mechanical Reproduction*. Edited by Pamela L. Caughie. New York; London. Garland Publishing.

REED, T.J., 2002: 'Mann as Diarist'. In *The Cambridge Companion to Thomas Mann*. Edited by Ritchie Robertson. Cambridge. Cambridge University Press.

WOOLF, Virginia, 1928: 'Flying over London'. In *Virginia Woolf Selected Essays*. Edited by David Bradshaw. Oxford University Press. 2008.

WOOLF, Virginia, 1929: 'The Searchlight'. In *A Haunted House: The Complete Shorter Fiction*. Vintage Classics. *2003*.

[journal articles]

BELL Alexander. 1875. "Transmitters and Receivers for Electric Telegraphs." U.S. Pattent number 161, 739.

EINSTEIN, Albert (1916), "Die Grundlage der allgemeinen Relativitätstheorie", originally printed in Annalen der Physik 49. In *The Collected Papers of Albert Einstein*. Vol 6. The Berlin Years Writings, 1914–1917. Ed. by A. J. Kox, Martin J. Klein, and Robert Schulmann. Princeton N.J. Princeton University Press, 1996.

FORMAN, Paul, 1971: 'Weimar Culture, Causality, and Quantum Theory, 1918-1927: Adaptation by German Physicists and Mathematicians to a Hostile Intellectual Environment'. *Historical Studies in the Physical Sciences*, edited by Russell McCormmach. Philadelphia. University of Pennsylvania Press.

GREENBERG, Valerie D., 1985: 'Literature and the Discourse of Science: The Paradigm of Thomas Mann's "The Magic Mountain"'. In South Atlantic Review, Vol. 50, No. 1 (Jan.). South Atlantic Modern Language Asociation

HEGGLUND, Jon. 2003. '*Ulysses* and the Rhetoric of Cartography'. In Twentieth Century Literature, 49, 2.

PAUL A. Hanle, 1979: 'Indeterminacy before Heisenberg: The Case of Franz Exner and Erwin Schrödinger'. In Hist. St. Phys. Sci., 10.

PRUSOK, Rudi, 1973. 'Science in Mann's Zauberberg: The Concept of Space'. In Modern Language Association. Vol. 88, No. 1 (Jan).

WOOLF, Virginia, 1905. 'Literary Geography'. In Times Literary Supplement. March 10. p. 81.

ZANARINI Gianni, 1994. 'Legge e caso alle origini della fisica contemporane'*,* La Fisica nella Scuola, XXVII, pp. 155-160.

[newspaper articles]

The Child's Companion (London, England), [Date Unknown]; pg. 83. (329 words). New Readerships.
'The Highest Monument in the World'. *The Pall Mall Gazette* (London, England), 15.2.1887. Issue 6838
'The Electric Lighting.' Freeman's Journal and Daily Commercial Advertiser (Dublin, Ireland), 10.10.1878. Issue N/A.

'The Parisian Tower of Babel'. *The Dundee Courier & Argus* (Dundee, Scotland), 15.6.1888. Issue 10900. 19th Century British Library Newspapers: Part II.

'Wireless Telegraphy'. *The Standard* (London, England). 6.4.1899. Issue 23330. 19th Century British Library Newspapers: Part II.

[electronic versions, Internet sources, blogs etc.]

The Eiffel Tower official website: http://www.tour-eiffel.fr/teiffel/uk/.

The Times: Digital Archive 1785-1985.

The MoMA official website:
http://www.moma.org/collection/details.php?theme_id=10068&section_id=T020544

Index