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A Glimpse Of What Was

A Glimpse of What Was

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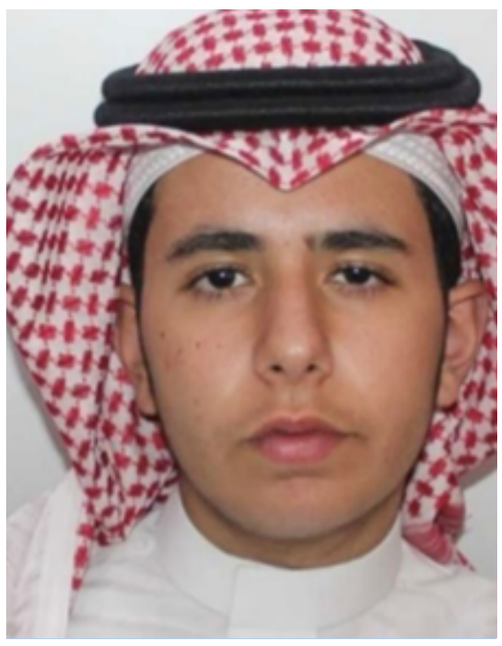

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About the AMRC

Every single year, the Al Mawakeb Research Center breaks boundaries and transcends expectations. No matter the challenge, time and time again, we redefine what it means to think not only outside the box, but outside the room of the box. What truly makes AMRC distinguished is how we define "we". AMRC is completely student-run. But when "we" say "student-run," we're not just referring to the hardworking heads, nor even to the earnest executive board. So, who really makes AMRC what it is?

You... You made this possible. Regardless if you are one of our cherished members or just an avid knowledge-seeker, the center and this book are but a culmination of your and our shared efforts, guided by the determination and commitment that arise from the passion of research. You are the force that breaks outside the box. At AMRC, we are more than just a research center; we are a vibrant community where students come together to ignite their curiosity, explore the realms of knowledge, and shape their future.

Much like the orchids that have come to symbolize our theme this year — at AMRC, we honor resilience and adaptability. Orchids can bloom from the sultriest tropics to the iciest peaks, transcending nature's adversities. Their beauty symbolizes not just elegance, but evolution and triumph. As we navigate our own paths, we must embody the orchid's tenacity. In life's ever-shifting landscape, with the orchid's versatility and virility, we too can bloom brilliantly.

-Adel Almheiri and Yazan Hannoun
Head of the AMRC Boys in Al Mawakeb Barsha

Chapter 1

The Rise of Women's Education in the 19th Century

Rakan Al Rakan

For as long as the concept of gender roles have existed, so have the clearly defined separate areas of life they have constricted both genders to. Women were often discouraged from seeking further education in favor of becoming housewives and not meddling in the matters of men. Men and women operated on "separate spheres", with each gender claiming dominion over certain roles and areas of life (Guildford, 2006). In the domestic sphere that women were constricted to, they were expected to perform their roles and duties diligently as caretakers of the household, sacrificing any pre- existing intellectual pursuits in favor of keeping tradition. While men on the other hand participated in public life and provided for their families. For a man to have been able to properly make a name for himself in the public's eye he had to have been educated. A man couldn't debate with a fellow colleague on economic policies or the ethics of scientific discoveries if he hadn't been given access to intellectual spaces and schools of thoughts to build his arguments and ways of thinking from. The sticking to these clearly defined spheres of dominion limited the accessibility of academic resources and educated spaces for women in the 19th century.

Even in the times where women were allowed to receive an education, it was primarily based on moral, religious, and artistic pursuits. Women's education was never encouraged or promoted outside the home, especially not in professional or academic fields. Even then, this education was never for the woman's own benefit or intellectual pursuit, it was to portray the family as cultured and part of the elite class, which would subsequently lead to their daughters becoming more desirable for high ranking suitors. This goes to show that even in the off chance a woman were to be able to receive an education, it was still tied back to men. This example also exemplifies intersectionality in regards to classism and sexism in women receiving education. Only women part of the higher classes were able to receive one, and while rudimentary still, it was more than the lower class women who were majority illiterate.

Furthermore, even if both men and women participated in a certain activity, it was always considered that men's contributions were more profound and impactful, and therefore given more precedence. A woman was expected to cook daily for her family and not receive any recognition for this invisible labor, but a man would be praised as a culinary genius and would receive accolades for his fine taste in culinary arts. (Hothschild, 1989). The setting for a woman playing the piano was always the middle class drawing room, not the concert hall. A woman is presented as a passive figure (Theobald, 1996), merely playing the music composed by the old masters.

Women alive in the 19th century lived through the period after a time called The Age of Enlightenment, in which certain ideals and philosophies were introduced and gained quick popularity. The ideas encouraged included ideas of reason, rationality, social progress, civil duties, and individual rights. The Enlightenment saw an increase in ideas about human rights and social equality, which challenged the traditional hierarchies and oppressive systems set to keep women out of educational institutions. Philosophers such as John Locke

and Jean-Jacques Rousseau wrote about and emphasized the inherent dignity and equality of all individuals. These ideas provided a philosophical basis for advocating for women's rights, which included access to education as a fundamental aspect of personal development and societal progress. Civil duties were also heavily campaigned for in the age of enlightenment, because if all citizens were expected to properly contribute to the welfare of society, they needed to be educated. Advocates for women's education argued that educated women could fulfill their civic duties more effectively and contribute to social reform efforts aimed at improving the conditions of women and society as a whole if given proper access to education.

Another major contributing factor to women's rise in education in the 19th century was the rapid industrialization that the world was being subjected to. The invention of a multitude of technologies led to extreme changes in the old ways of life that people were used to. The shift from traditional agrarian societies to industrialized cities brought about employment for women in factories and vocational training centers as there was a need for traditionally female tasks that men did not know how to perform, or at least could not in the same capacity. This can be seen especially in fields such as textiles and more domestic based work. This demand for work encouraged families to educate their daughters as educated women were more successful in securing employment, consequently increasing household income. Public opinion in regards to women receiving an education was forced to have been viewed in a more positive light, as uneducated women could not perform tasks and duties in the same calibre, speed, or quality as an educated female population would be (Green, 2001).

Yet another major catalyst for the rise of women's education are the plethora of social reform movements that took place at the turn of the 19th century. Many women, especially black women participated in the abolitionist movement which called for an end to the transatlantic slave trade and chattel slavery. This movement allowed for many women to find themselves in academic spaces where debates regarding the ethics of slavery would be fervently discussed and debated. This forced these women to head towards self improvement and advocacy for female education in hopes of achieving their cause. Women participating in the movement also found opportunities for social and intellectual engagement (Dayton, 2012) as they recognized the importance of educating enslaved people on their rights and the functions and necessities of modern day life, and that included the women. Also aside from purely academic education, women also gained experience also with leadership and advocacy which is another form of education.

Another social reform movement that affected women's rise in education in the 19th century was the women's suffrage movement; which fought for women's right to vote in political elections. Suffragists emphasized the importance of educated and informed citizens in a democratic society, and advocated that women's access to education is not only a necessity, but a prerequisite for meaningful participation in civic life. Political activism was difficult and the women of the time recognized that they needed an educated female populace to aid them in their journey of political equality and advocacy. The Woman's Suffrage movement needed educated women to carry out and perform the necessary tasks to advocate for their goals and rights. This included things like organizing protests, writing newsletters and advertisements, drawing illustrations, and organizing boycotts. Suffragists mobilized support for women's education as a means of empowering women politically and socially.

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The rise of women's education in the 19th century led to immense economic development for the nations that supported women's education early on. Education acts as a mobilizer and when nations provide their female population access to education, academic institutions, adequate research facilities, and support in intellectual pursuits and endeavors, they effectively increase their own economic output while simultaneously promoting the needed equality in egalitarian societies (World Bank, 2012)

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Chapter 2

The Influence of Romanticism on 19th-Century Poetry

Abdullah Thamir Alsadoun

Introduction

The Romantic period, which spanned between the 18th century and the 19th century, has shaped the way poetry is as we know it. The Romantic period was a cultural movement in which individualism, emotion, and music were emphasized. The period itself was preceded by the rationalism of the Enlightenment era, where order prevailed. As a means of reciprocation to the order of the Enlightenment era, the Romantic period started. Key poets of this period include Percy Bysshe Shelley who pioneered in lyrical intensity, Samuel Taylor Coleridge, and Lord Byron.

Characteristics of Romantic Poetry

Romantic poetry has a diverse amount of unique characteristics that set it apart from any other literary genre, such as the celebration of an individual's emotions, inner experiences, and passions. Romantic poetry explores themes of love, joy, longing, and despair, going deep into the human consciousness. As an example, in the poem "I Wandered Lonely as a Cloud" by William Wordsworth, the speaker explores the ability of nature to induce calmness and joy, expressing his profound love for nature. Continuing on the topic of nature, Romantic poets used nature as a source of inspiration, beauty, and joy. They always sought to encapsulate the grandeur and ability to convey intense feelings that nature has.

Another theme and key characteristic of Romantic poetry is the rejection of societal norms, where Romantic poets frequently rebelled against the restrictions of society, instead advocating freedom, creativity, and self expression.

Escapism from Reality

Romantic poetry uses mythical elements, dreams, and nature as a means of escapism. Romantic poets see everyday life as mundane and boring, so escapism serves as a way to transcend it. A great example of this is in Lord Byron's "Childe Harold's Pilgrimage," where the protagonist of the narrative seeks escape from a bland life as he explores the beauty of nature and diverse cultures. Throughout the poem, Lord Byron emphasizes the vivid description of nature, which brews a sense of wonder and amazement. Finally, Lord Byron uses the incorporation of mythology into his poem, where the protagonist finds ancient ruins, mountains, and seas, showing us the insignificance of humankind in the face of nature.

Emotional Intensity and Subjectivity

In Keats' "Ode to a Nightingale," intense emotions were conveyed through sensory language, vivid imagery, and introspection. Romantic poets symbolize human experiences through the use of nature as a backdrop, utilizing personal reflection to imbue their works with emotional depth. In "Ode to a Nightingale," the nightingale's song was used as a metaphor for the fleeting nature of life itself. Similarly to Keats' work, both "Lines Composed a Few Miles Above Tintern Abbey" by Wordsworth and "Ode to the

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West Wind" by Shelley dive deeper into the themes of the human imagination, illustrating the exploration of emotional intensity the Romantic movement has done.

Influence on Literary Form and Language

Romantic poets revolutionized and changed the way everyone approaches literature, adopting a more personal and emotional approach to it. Unlike its predecessor in Neoclassicism, which emphasizes formal language and the reason behind everything, Romantic poetry shaped the scene by adopting a different approach and capturing the beauty and significance of everyday life. Romantic poets did this by using ordinary language and common life situations. In a collaborative work called "The Lyrical Ballads" by Wordsworth and Coleridge, the poem revolutionized the poetic scene through the utilization of everyday words and the depictions of living a rural life. This change from Neoclassical norms didn't only change the way we looked at literature but also laid the groundwork for the Romantic movement's birth.

Impact on Later Poets

Romantic poetry's impact resounds through generations of poets, which is evident in the works of American literary figures such as Emily Dickinson and Walt Whitman, who were both inspired by the romantic ideals of individualism, freedom, and self-expression. In Walt Whitman's "Leaves of Grass," the poems embody the romantic spirit through the celebration of democracy, the human body, and the interconnectedness of things. Similar to Whitman, Emily Dickinson's introspective poetry explores themes of inner experience and the exploration of oneself. Both of these poets diverged from the traditional poetic standards, embracing the Romantic movement's use of unconventional language to convey their perspectives, which carried the idea of Romanticism into American literature.

Conclusion

To conclude, Romanticism's lasting effect on literature and poetry has resonated throughout the world, leaving a permanent mark. The elevation of individual expression, emotional depth, and connection to nature are where its impact lies. The first Romantic poets shattered the confines of traditional literature, paving the way for more creativity and innovation in the world of literature. In the modern era, the idea of Romanticism lies in the works of poets who discuss themes of identity, existentialism, and the human experience as a whole. Thus, Romanticism remains a vital pillar in shaping the landscape of literature and poetry, reminding us of the beauty around us, both in the human spirit and in nature.

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Improvement in Education during the 19th Century

Abdulrahman Munther Abalkhail

Over the years, education continues to improve, and as time goes by, there are new innovations that help improve our education. Education during the 19th century is certainly different from the education we have today, but the 19th century had improvements that helped us reach where we are today. In the 19th century, the way they learned was different, as they primarily focused on memorizing information instead of focusing on areas such as grammar and arithmetic, which we learn today. Education in the 19th century was mostly available to wealthy people, and that was fixed thanks to the Public Education Movement. There were many other different things that helped improve education in the 19th century, such as the Progressive Education Movement, which was led by important educators such as John Dewey.

The Progressive Education Movement was one of the most important movements in the 19th century. Led by important educators such as John Dewey, the movement focused on learning by doing, focusing on students, and teaching more useful skills than traditional memorization. It focused on making students develop important skills such as problem solving and critical thinking. This movements effects can be seen in today's education. Another movement that was extremely crucial to improving education was the Public Education Movement. This movement focused on making education free for everyone; it promoted equal opportunities for education, regardless of people's wealth or background. There have been similar movements to this in the 19th century that promoted equal education opportunities, such as the Women's Suffrage Movement. The Public Education Movements effect can also be seen in today's education, thanks to this movement, most countries around the world today have public education systems or public schools. Both of the movements covered were very crucial to improving education in the 19th century.

There were many technological innovations in the 19th century that helped improve education. The printing press was one of the technological innovations that helped improve education, as it introduced textbooks which made education more accessible. The invention of the electric light was also an innovation that helped students study for longer hours. An important innovation was blackboards, as they were used to provide information, which helped teachers deliver the information more easily to the students. The invention of the telephone also counts as a technological innovation that helped improve education, as it was the first glimpse of distance learning. All these innovations in the 19th century helped to improve education, as they made learning more accessible and easier for both students and teachers.

The 19th century was a period that changed many things in education. Before all the improvements to education that happened in the 19th century, the literacy rates around the world were about 12%, but after the improvements, the literacy rates around the world more than doubled. The investment in education per child also increased in the 19th century, from about $5.33 to $20.53, which just shows the significance of the improvements that happened in the 19th century. After the 19th century, there was an increase in high

school graduates from 2% to 8.8%, as well as college enrollment, which increased from 1.7% to 5.1%. All of these statistics and facts reflect the changes in education and improvements that have occurred in the 19th century.

To conclude what has been said, there were many improvements made during the 19th century towards education, which included the many movements that helped improve the education system and make education more accessible to everyone, such as the Public Education Movement. There were also many technological innovations that helped improve education, such as the printing press, textbooks, and blackboards. There are many statistics that show how much the 19th century has improved education globally, such as the literacy rate that doubled during the 19th century. The 19th century was a period that had a significant impact on education, and the effects of the impact it had can be seen today. All the improvements that were made in the 19th century were really important for us to reach our level of education, and I believe that over time our education will only continue to improve and get better, which could happen due to new innovations like they did in the 19th century.

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Chapter 3

Discoveries in Science and Technology during the 19th Century

Omar Eyad AlMidani

Significant scientific and technological developments during the 19th century revolutionized human society. The following are some significant findings: Michael Faraday (1791–1867): Faraday's early 19th-century experiments established the connection between electricity and magnetism. His contributions paved the way for the advancement of electric motors and generators. (Oxford University Press, 2021). The laws of electrolysis, which explain the connection between chemical reactions and electric current in electrolytic cells, were also developed by Faraday as a result of his work (James, 2020). His discoveries in this field have useful applications in a number of industries, such as electroplating and metal refining (Gooding, 2021).

Charles Darwin's Theory of Evolution (1809–1882): Presented in his seminal work "On the Origin of Species" (1859), Darwin's theory of evolution by natural selection revolutionized biology and our understanding of the natural world. Darwin (1859). The varied flora and fauna of the Galápagos Islands, as well as Darwin's observations made during his voyage on the HMS Beagle, all had an impact on his theory (Browne, 1995). Based on his observations of differences between populations and between different geographic locations, he postulated that the variations among species were the consequence of slow changes over time (Browne, 1995).

Furthermore, evidence from several disciplines, such as paleontology, comparative anatomy, and embryology, supported Darwin's theory (Gould, 2002). According to Gould (2002), the discovery of fossils allowed us to witness the slow evolution of species over millions of years by providing a record of extinct and transitional forms.

Dmitri Mendeleev (1834–1907): Based on their atomic masses and chemical characteristics, Mendeleev's work in the late 19th century arranged the known chemical elements into a systematic table. This led to the creation of the Periodic Table. His periodic table offered a foundation for comprehending the connections between various elements and forecasting the characteristics of as-yet-undiscovered elements. Levi (1971). Mendeleev's discovery made a more methodical knowledge of the elements and their behavior of the periodicity of chemical properties (Scerri, 2019). His periodic table aided in the discovery of new elements in the ensuing years and offered a framework for forecasting the characteristics of unidentified elements.

Theory of Thermodynamics: The first and second laws of thermodynamics were developed in the 19th century by physicists like Sadi Carnot, Rudolf Clausius, and Lord Kelvin. The domains of physics and engineering were shaped by these laws, which established basic principles controlling energy transformation and transfer. In Castel and Boles (2014) Photography by Louis Daguerre (1787–1851) and Joseph Nicéphore Niépce (1765–1833): Visual communication and art were transformed when photography was developed in the early 19th century. The daguerreotype process, invented by Niépce and Daguerre, made it possible to use light-sensitive materials to create permanent images.(Gernsheim,1969)

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James Watt's The Steam Engine (1736–1819): The steam engine was developed earlier, but Watt's advancements in the late 18th century made it much more efficient and useful, which helped the steam engine become widely used in industry and transportation in the 19th century. (Smil, 2006)

Cyrus Field's Transatlantic Cable (1819–1892): Cyrus Field spearheaded the successful installation of the first transatlantic telegraph cable in 1858, which greatly shortened the time it took to send messages across the ocean and allowed for quick communication between Europe and North America. Gordon (2003)

James Clerk Maxwell's Theory of Electromagnetic Radiation (1831–1879): When Maxwell developed his equations in the middle of the 19th century, they offered a cohesive framework for comprehending electricity, magnetism, and light as various expressions of electromagnetic radiation, which is the same phenomenon. The advancement of contemporary physics and technologies like radio and telecommunications were made possible by his work. (Maxwell, 1865)

William T.G. Morton (1819–1868) and others, Anesthesia: By removing pain during operations, the discovery and development of anesthesia in the 19th century transformed surgery and medical procedures. Modern anesthesia practice began in 1846 with Morton's demonstration of ether anesthesia. Snow (1847)

Rise of Modern Geology: The 19th century saw a number of important developments in the science of geology, including Charles Lyell's theory of geological evolution and James Hutton's formulation of the uniformitarianism principle.

The extraordinary advances in science and technology that characterized the succeeding centuries were made possible by the discoveries and inventions of the 19th century. The 19th marked the biggest discoveries in science and technology which made us live in a life where, for every problem, there is always a solution for it.

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Chapter 3

The Development of Timekeeping and the Standardization of Time in the 19th Century

Nawaf Hussain Alhammami

The 19th century stands as a pivotal era in human history, marked by profound technological, economic, and social transformations that set the stage for the modern world. Among the many innovations that emerged during this period, perhaps none was more consequential than the development of standardized timekeeping systems.

This paper delves into the historical context, the creation of Greenwich Mean Time (GMT), early innovations in timekeeping, the process of standardizing time, international efforts, challenges faced, resistances encountered, causes of standardization, and the far-reaching societal and economic impacts of this monumental development.

To comprehend the significance of standardized time, it is crucial to recognize the historical backdrop that necessitated such a system. Prior to the 19th century, time was primarily determined by local solar observations, leading to considerable discrepancies in timekeeping practices across regions. However, with the advent of

global trade, expanding transportation networks, and the rapid growth of communication systems like the telegraph, it became imperative to establish a more uniform and synchronized approach to time measurement (Thompson, 2012).

The creation of Greenwich Mean Time (GMT) emerged as a solution to the challenges posed by divergent timekeeping practices. The International Meridian Conference of 1884, held in Washington, D.C., brought together representatives from 25 nations who unanimously agreed to adopt Greenwich, England, as the prime meridian and the reference point for global timekeeping (Howse, 1997). This landmark decision provided a universal standard for time measurement, enabling seamless coordination and communication across continents.

The 19th century witnessed remarkable innovations in timekeeping technology that laid the foundation for standardized time systems. Clockmakers and scientists tirelessly worked to improve the accuracy and reliability of timepieces. Innovations such as the chronograph, mechanical escapements, and pendulum clocks revolutionized time measurement, making precise and consistent timekeeping possible (Sobel, 1996).

However, standardizing time was no simple feat. It required international cooperation, diplomatic negotiations, and scientific consensus. The introduction of standard time zones was a critical step in dividing the world into segments, each with its designated offset from GMT. This systematic division facilitated global coordination and synchronization, particularly in transportation schedules, economic activities, and communication networks.

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International organizations, such as the International Meridian Conference, played a pivotal role in promoting standardization efforts. Diplomatic negotiations and scientific collaborations were instrumental in overcoming cultural, political, and technological barriers to achieve a global consensus on timekeeping (Thompson, 2012).

Despite the concerted efforts, the standardization of time faced numerous challenges and resistances. Some nations were initially reluctant to adopt GMT as the prime meridian due to historical rivalries, national interests, or cultural considerations. For instance, France, which had previously used the Paris Meridian as the reference point, initially opposed the adoption of Greenwich as the prime meridian (Landes, 2000). Additionally, technological limitations and infrastructure constraints posed formidable obstacles to implementing standardized time systems in remote or underdeveloped regions.

The standardization of time was driven by various factors, including the need for efficient global communication, transportation, and commerce. Standardized time systems provided a common framework for coordination and synchronization, enhancing operational efficiency and fostering economic growth. With synchronized time, individuals and organizations could plan and execute activities more effectively, leading to increased productivity and improved coordination across international borders (Poole, 2009).

The standardization of time had profound societal implications, reshaping daily life and social interactions. Standard time enabled individuals and communities to synchronize their schedules, facilitating coordination in work, travel, and leisure activities. The concept of "being on time" became a shared understanding, and the consistent measurement of time fostered a sense of temporal unity, transcending geographical boundaries and fostering a shared sense of temporal identity among diverse cultures (Thompson, 2012).

Furthermore, the standardization of time catalyzed economic transformation on a global scale. It revolutionized commerce, transportation, and industrial production. Synchronized transportation schedules, particularly in the burgeoning railway industry, led to increased efficiency and reliability in the movement of goods and people. Standard time systems facilitated global market integration, enabling cross-border transactions and promoting economic development (Landes, 2000).

In conclusion, the development of timekeeping and the standardization of time in the 19th century represented a monumental achievement in human history. This transformative process, driven by technological innovation, international cooperation, and economic imperatives, reshaped societies, economies, and cultures worldwide. As we reflect on the enduring legacy of standardized time systems, we recognize their indispensable role in shaping the modern world, enabling global coordination, facilitating international commerce, and fostering a shared sense of temporal unity among humanity. The standardization of time stands as a testament to human ingenuity and the ability to overcome challenges for the collective benefit of society.

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Chapter 3

The Development of Timekeeping and the Standardization of Time

Abdulrahman Raid Alhusain

Time has always fascinated and inspired civilizations since it is both an abstract idea and a vital component of human existence. The creation of timekeeping systems and the standardization of time have played a crucial role in forming human societies and promoting trade, commerce, and scientific advancement. This research paper explores the complex history of timekeeping, from antique sundials through modern atomic clocks, and how advances in technology, cultural influences, and societal ramifications have influenced how we perceive and measure time.

The origins of timekeeping dates back to ancient times when the Babylonians and Egyptians began to measure time at least 5,000 years ago, introducing calendars to organize and coordinate communal activities and public events, to schedule the shipment of goods and, in particular, to regulate cycles of planting and harvesting. Sundials and water clocks were a pioneer in time measuring, thought to have originated in Southern Mesopotamia and ancient Egypt. Humans invented clocks from the daily motion of the Sun. The Egyptians used a water clock in the 16th century BC, the ancient Romans made the first clock by measuring water flowing into a container. Later sand was used in an hourglass. These clever tools offered a simple but effective means of telling time by using the sun's shadow to determine the time of day.

Time is uniform, but it wasn't always so. Standardization didn't begin to emerge until the late 19th century. Sanford Fleming, a Canadian engineer of Scottish descent, is recognized as the founder of time standards. Throughout his career, Fleming was employed by the railroads; he began as a surveyor and then managed construction and maintenance. He knew a great deal about the problem of Railway Time. In 1878, Fleming released his debut pamphlet, Terrestrial Time. While acknowledging Charles Dowd's input to his work, Fleming's method was comparable to Dowd's and went one step farther in terms of time standardization. Citing the example of a British passenger on a steamship who changes to a train in North America, he advocated for worldwide norms. Dowd proposed his plan for standardizing time in 1869. The plan called for the creation of "time belts," or zones, that would standardize the time across the continent. Dowd suggested that the country be divided into four or five of these zones. Every place within a given zone would have the same time. Dowd established his concept to incorporate time standards in hour portions, or time zones, positioned similarly to those in use today, after gaining provisional permission from some railroad firms. Railroad superintendents Joseph F. Boyd, E. G. Barney, and Robert Harris tried to persuade. Dowd to relocate his meridian from Washington to New York in 1872. In an attempt to prevent additional disagreements about the meridian's position, Dowd looked for a more impartial location and suggested Greenwich Mean Time. At the General Time Convention in 1873, a group of railroad managers and supervisors got together and passed a vote endorsing Dowd's work. Although a resolution appeared hopeful after this voting, the Convention members did not take any more action. by the late 1870s, Dowd and his plan for time standardization plan were all but forgotten.

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The creation of mechanical clocks in medieval Europe was a major step toward the standardization of time and timekeeping. This made trade, travel, and communication much easier. It also paved the way for the creation of set work schedules and the idea of punctuality. Clocks gained prominence throughout the Renaissance and were frequently embellished with elaborate patterns and decorations. Originally powered by water or weights, these clocks allowed for more accurate scheduling of events and activities due to their more reliable timekeeping when compared to sundials. The 14th century saw the advancement of escapement mechanisms, which increased clock accuracy even further and set the stage for increasingly advanced timekeeping devices.

As cultures developed and interacted throughout history, the necessity for consistent time measurement became more and more evident. The creation of time zones and the acceptance of international standards like Coordinated Universal Time (UTC) replaced regional differences in timekeeping. These endeavors have not only sped correspondence and trade but also enabled progressions in the domains of science, navigation, and several other areas.

To conclude, from antique sundials to atomic clocks, timekeeping has undergone a remarkable history driven by inventiveness, ingenuity, and the pursuit of perfection. Time standardization has been essential in facilitating worldwide coordination and synchronization among various fields. Timekeeping will always be a monument to humanity’s pursuit of knowledge and control over the passage of time, even as we continue to push the limits of scientific research and technological advancement.

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Chapter 3

Discoveries in Science and Technology during the 19th Century

Mohammad Salman Binsaid

During the 19th century, there was a huge shift and development in scientific and technological fields. This period witnessed some of the most important discoveries and developments that eventually transformed our lives in modern times. For instance, Morton came to the discovery of anesthesia in 1846 and made the possibility easier for operations, while Mendeleev further developed and explored our knowledge in chemistry through the periodic table in 1869 for the organization of the elements. By the way, Thomas Edison invented an electric light bulb in 1879, which changed the lifestyle of people since then. For example, after this invention, people obtained a reliable source of artificial light at home, in the office, and even on the street. In 1839, Louis Daguerre invented the possibility to take photos by himself. This particular fact provided an opportunity for people to take and save their bright moments in the form of a picture. All these discoveries and much else provided the foundation on which the technologies that we take for granted today were built and helped shape the modern world.

The Discovery of Anesthesia:

In 1846, dentistry pioneer William Morton revolutionized medicine with his discovery of anesthesia's potential. While attending a chemistry lecture at Harvard, Morton witnessed the calming effects of inhaled nitrous oxide, also known as "laughing gas." Inspired by this observation, he began experimenting with its use in dentistry. On October 16, 1846, Morton successfully performed a painless tooth extraction on a patient using inhaled ether, marking a significant milestone in medical history. This discovery paved the way for the use of anesthesia in surgery, allowing patients to undergo procedures without experiencing excruciating pain. Morton's contribution significantly reduced surgical complications and mortality rates, forever changing the course of medicine. Morton's groundbreaking contribution not only revolutionized surgical practices but also ushered in a new era of patient comfort and well-being.

The Discovery of the Periodic Table:

In 1869, Dmitri Mendeleev created the modern periodic table, leaving gaps for undiscovered elements. He arranged the elements based on their atomic weight and rearranged them when necessary. The periodic table didn't happen overnight but through the work of many scientists over time. Mendeleev's version is the most well-known, but chemists like Döbereiner, Newlands, and Meyer all played a role in identifying patterns and laying the groundwork for Mendeleev's table. What makes Mendeleev's table special is that he used it to predict the existence and properties of elements that hadn't yet been discovered. This shows how scientific discoveries build upon each other, with each generation adding new layers to the foundation laid by those before them.

Discovery of the light bulb:

The invention of the light bulb was a long and complex process that spanned over several decades. Humphry Davy was the first to create an electric light in 1802, but it was not practical for commercial use

because it burned out quickly and was too bright. Other inventors followed, each making improvements to the design. Warren de la Rue created a design with a platinum filament in 1840, but it was too expensive to produce. Joseph Swan also made significant contributions by creating a light bulb with a carbonized paper filament in 1850. However, it was Edison who finally created a commercially practical light bulb in 1878 by using a carbonized bamboo filament that lasted over 1200 hours. Edison's invention was a breakthrough and revolutionized the way we live, work, and interact with each other. Today, light bulbs are an essential part of our daily lives and continue to evolve with new technologies, such as LED and smart bulbs.

Discovery of Photography:

The discovery of photography was a long process that involved the efforts of many individuals. Joseph Nicephore Niepce captured the first successful photograph in 1826 using a process called heliography. The exposure time was eight hours, which was significantly reduced to thirty minutes by Louis Daguerre in 1829. Daguerre discovered that a latent image could be formed on a plate of iodized silver and developed by exposure to mercury vapor. In 1837, Daguerre permanently fixed the image using a solution of table salt. The daguerreotype process was made public in 1839. William Henry Fox Talbot's photogenic drawing was another early photographic process that involved paper sensitized with silver nitrate and sodium chloride. Initially, Talbot's process was not permanent, but in 1839, John Herschel discovered a method to fix the negatives with sodium thiosulfate, which improved the process. Talbot's process allowed for multiple positives to be made from a single negative.

In conclusion, the 19th century has had several significant discoveries and inventions that revolutionized people's lifestyles and perspectives. These included groundbreaking innovations such as anesthesia, which ensured safer surgical procedures, and the periodic table, which helped chemists comprehend the functioning of elements. Additionally, the discovery of the light bulb and photography made it easier for us to capture and recognize memories more efficiently. All of these advancements were made possible by the absolute power of human intelligence and have left an indelible mark on science and technology.

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Chapter 3

Discoveries in Science and Technology during the 19th Century

Adel Aswad

The 19th century is often referred to as the Age of Innovation, due to the unprecedented transformations driven by industrialization, scientific developments, and new inventions. The scientific discoveries and technological innovations during this time reshaped society's structure, propelled economic growth, and revolutionized the daily lives of people.

The Industrial Revolution, originating in Britain in the late 18th century and extending throughout the 19th century, had a remarkable amount of technological progress. One of the most important technological advancements at the time was the mechanization of manufacturing processes. Innovations like the steam engine, pioneered by James Watt.(Science and Technology 2 min read, n.d.) The steam engine transformed industries by powering machinery that helped with iron production and transportation systems. The ability to harness steam power allowed suppliers and workers to be more productive, leading to the creation of factories and mass production techniques that changed how economies all around the world work through the improvement of the factors of production.

Another significant technological development was the revolutionization of transportation. Steam-powered locomotives and steamships emerged as new technologies, allowing for faster and more efficient movement of goods and people (www.boem.gov, n.d.). Railways expanded rapidly, allowing for previously isolated cities to now be connected, along with steamships helping to facilitate global trade and travel on a large scale. These advancements in transportation not only accelerated urbanization but also allowed different countries to depend on each other more, improving international relations.

Scientific breakthroughs during the 19th century laid the foundations for future innovations that still impact society to this very day (Hughes, 2004). The principles of electromagnetism by Michael Faraday and the formulation of electromagnetic theory by James Clerk Maxwell revolutionized electrical engineering. Faraday's experiments with electromagnetic induction led to the development of electric generators and motors, things that to this day are used for many things, and they have had impacts on a global scale on many sectors, not limited to but including the Economic sector, the education sector, in fact, almost anything one could think of.

Advancements in thermodynamics by Sadi Carnot and Rudolf Clausius contributed to the refinement of steam engine efficiency and fueled further industrialization. The theory of evolution by Charles Darwin in his seminal work "On the Origin of Species" was a game changer in terms of scientific debates and inspired biological sciences, fundamentally reshaping the understanding of the natural world and changing societal patterns.

The 19th century witnessed improvements in communication with the increasing use of telegraphy and

the printing press. The invention of the telegraph by Samuel Morse in 1837 changed long-distance communication completely, allowing instantaneous transmission of messages over electrical wires (Elon University, 2005). This had a sure effect on not only international communications and globalization but also military efforts by countries as it was now easier to instantly send a message to a fleet of troops whether to switch areas, retreat, or attack. There could be critiques however in general the Telegraph networks had other benefits spanning continents and facilitating rapid information dissemination for commercial and governmental purposes.

Furthermore, advancements in printing technology, including the development of rotary printing presses, revolutionized publishing and information spreadability. The ability to mass-produce newspapers, and books, allowed for hundreds of millions of people to have better access to knowledge, fueling intellectual growth and education. Photography, pioneered by Louis Daguerre and William Henry Fox Talbot, introduced visual documentation capabilities that transformed sectors like art, science, and journalism, providing new ways to capture and share the world.

Moving away from industrialization and scientific innovation the transformative impact of improvements of technology fundamentally reshaped societal structures, labor practices, and economic systems. Urbanization surged as industries started to rapidly increase around factory towns, grabbing rural populations into urban centers in search of employment. The division of labor evolved, with specialized roles emerging in manufacturing and service sectors, shaping modern labor practices and workforce dynamics that are currently being followed.

The interconnectedness caused by technological advancements fueled global trade and diplomatic relations, forging international networks of commerce and cultural exchange. The development of telegraph networks and transportation systems enabled countries to work together, to facilitate the exchange of ideas, goods, and people across continents. The economic and social transformations of the 19th century set the stage for further technological progress, setting up the stage for modern society.

The 19th century was one of the most significant eras in human history, known for its Industrial Revolution and groundbreaking scientific discoveries. Innovations in electromagnetism, evolution, and technologies in communication and transportation fundamentally transformed industries, commerce, and daily life. These advancements not only reshaped society technologically, and scientifically but also impacted the social part of society with countries becoming much more interconnected, different cultures clashing, new cultures being created, old cultures being destroyed, and populations starting to rapidly increase. The improvements in technology in the 19th century had many effects, while a majority of them can be looked at as positive consequences there were a few negative sides to them highlighting how advancement is not always one hundred percent ethical in some cases, however, the benefits of the technological development of the 19th century far outweigh the consequences.

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Chapter 3

Discoveries in Science and Technology during the 19th Century

Ali Khalid Al Haqbani

Alfred North Whitehead once said, “The greatest invention of the nineteenth century was the invention of the method of invention.” This statement simply captures the complex and groundbreaking discoveries of the 19th century, which saw a historically unpredictable increase in creativity and inventiveness. The 19th century was a period of significant innovation, with notable advancements such as W.A. Burt’s creation of the typographer (the precursor to the typewriter), J.P. Knight’s invention of the traffic light, and Thomas Edison’s production of the first commercially viable incandescent electric light bulb. These innovations changed everyday existence and paved the way for further development in various areas. They represent the creativity of exploration, resulting in many major technological advancements that have changed our world today. The inventions and breakthroughs of the 19th century had influenced our society, and their impact had built a newer world.

John Dalton’s atomic theory, proposed in the early 19th century, revolutionized the field of chemistry by introducing the concept of atoms as indivisible particles. Dalton's hypothesis stated that each element is composed of unique and indivisible atoms, which are similar within an element but vary across different elements. Significantly, Dalton assigned atomic weights to the atoms of the 20 elements he was aware of at that time. This idea was groundbreaking for its time and would play a significant role in the development of the periodic table of elements throughout the 19th century. The view that atoms of distinct elements are differentiated by variations in their masses introduced new ideas for scientific investigation. Every inch of Dalton’s theory has since been changed or perfected, but its main model continues to serve as the foundation for modern chemistry and physics.

In the 19th century, the improvements in the medical century were unmatched; it was unlike anything we had ever seen before. The invention of anesthesia, which was first developed by William Morton in 1846, brought about a significant transformation in surgical practices by allowing for painless surgeries. In addition, the germ theory of illness, first suggested by Louis Pasteur and then advanced by Robert Koch, clarified the involvement of microorganisms in the development of infectious diseases. This discovery later resulted in advancements in sanitation and hygiene practices. Adding these stuff to the public health reforms, such as the development of sanitation systems, vaccination programs, and quarantine measures, had a significant role in managing epidemics and preventing the spread of infectious illnesses. These developments established a base for modern medicine and public health efforts, influencing healthcare systems and policies that focus on the prevention of diseases and the well-being of people.

The Industrial Revolution, which occurred from the late 18th to the 19th century, started a significant period that saw remarkable technical advancements and significant changes in society. Leading the way in this revolution were scientists like James Watt and George Stephenson, whose discoveries transformed the fields of manufacturing and transportation. James Watt’s improvements to the steam engine throughout the

late 18th century significantly improved its effectiveness and dependability. This breakthrough facilitated the automation of manufacturing, resulting in enhanced productivity and growth in the economy. George Stephenson, often recognized as the “Father of Railways,” led the development of the railway steam engine throughout the early 19th century. The “Rocket,” which he invented, showcased the capabilities of steam power in movement, resulting in the rapid growth of railway networks in Britain and later worldwide. The introduction of railroads brought about a significant transformation in transportation, allowing for the effective transportation of products and people over long distances. This, in fact, improved trade and promoted economic growth. The combined contributions of Watt and Stephenson revolutionized the Industrial Revolution, turning it from a vague concept into an actual reality and establishing the path for contemporary industrialized society.

The creation of the typographer by W.A. Burt during the 19th century was a significant achievement in the advancement of writing technology. The typographer, who is seen as an early version of the typewriter, was a mechanical device that could create written text by pressing characters onto paper. Although not as widely used as its successor, the typographer established the groundwork for the following advancements in typewriting technology, which allowed the development of more efficient and accessible writing tools that transformed communication and office automation.

The creation of the traffic light by J.P. Knight during the 19th century was a significant milestone in the history of transportation. The traffic light was originally created to control the movement of horse-drawn carriages and pedestrians in busy city areas, and it brought about an organized approach for controlling vehicle traffic. Knight’s idea used multicolored lighting to indicate to drivers when to progress, halt, or stop, therefore reducing accidents and enhancing traffic efficiency. This discovery established the foundation for current traffic management systems, which still have a vital function in guaranteeing road safety and overseeing traffic congestion in cities around the globe.

Thomas Edison’s groundbreaking research in the 19th century completely improved everyday life around the globe. Edison revolutionized lighting technology by creating the first affordable burning electric light bulb. His innovation offered a dependable and effective substitute for gas and candle lighting, providing illumination to homes, streets, and businesses with unmatched brilliance and durability. Edison’s efforts to profit from electric light not only removed the absence of light but also sped the process of electrifying cities and encouraged the development of today’s electrical infrastructure, establishing the groundwork for the electrified world we now live in.

During the 19th century, there was an important rise in creativity and innovation, leading to significant discoveries that had an enormous effect on society. Alfred North Whitehead's contemplation of the age as the "most significant development in the process of innovation" captures its profound and revolutionary nature. During the century, significant inventions such as W.A. Burt's typographer, which was a predecessor to the typewriter, J.P. Knight's traffic light, and Thomas Edison's incandescent electric light bulb, had an enormous effect on everyday life and set the stage for future progress. Scientific achievements, such as John Dalton’s atomic theory, established the basis for contemporary chemistry, while medical progressions like anesthesia and the germ theory of illness

transformed healthcare. The Industrial Revolution, driven by innovators such as James Watt and George Stephenson, revolutionized the processes of production and transportation, ultimately shaping today's industrialized society. Every invention reflects the essence of exploration and resourcefulness that marked the 19th century and still has an impact on society in the present day. We wouldn't be here if it weren't for the achievements of the 19th century.

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Chapter 3

The Creation and Development of Morse Code in the 19th Century

Azzam Al-Herbish

Before the 19th century and all the fuss around the telegraph revolution, ancient civilizations such as those in China, Egypt, and Greece used drum beats, signal fires, or smoke signals to exchange information between far-flung points.

However, such methods were limited by the weather and the need for an uninterrupted line of sight between receptor points. “These limitations also lessened the effectiveness of the semaphore, a modern precursor to the electric telegraph. (Jim)”. “Developed in the early 1790s, the semaphore consisted of a series of hilltop stations that each had large movable arms to signal letters and numbers and two telescopes with which to see the other stations” (History).

Just like ancient smoke signals, the semaphore could be affected by weather and other things that made it hard to see. So, people needed a new way to send messages over long distances that was dependable. This led to the creation of the telegraph.

“The idea for the telegraph was first conceived in the early 1700s, but the first individual to design a model and make it work as well as gain political support for it was Samuel Morse” (Elon University).

The telegraph designed by Morse consisted of two main components. “The transmitter connected and disconnected the circuit in order to transmit the signal. The register uses electricity and magnets to make indentions on a moving strip of paper with a lever. These indentions are in the form of dots and dashes based on how long the indention is on the paper” (Sawyer, et al).

Morse also created an American version of the alphabet for the telegraph using the dot and dash indentations created by the mechanisms of the register, called Morse code.

Morse's development of Morse code revolutionized communication, by providing a standardized and efficient method of encoding and decoding messages. Each letter of the alphabet and number were assigned a unique sequence of dots (short marks) and dashes (long marks) based on frequency of use. Initially, Morse code was transmitted as marks on paper, but operators quickly learned to interpret the code audibly, listening to the clicks of the receiver.

“To build the first telegraph line, members of Congress provided the finances to Morse, without which Morse would not have had the same success. The lines Congressional funding supported were eventually bought back at slightly above cost. Morse sent the first message by telegraph on May 24, 1844, from Baltimore to Maryland. Shortly after, he began to spread his telegraph line before the first transcontinental line was completed in 1861.” (Sawyer, et al).

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After the successful demonstration of Morse's telegraph in 1844, its adoption spread rapidly, reshaping not only communication but also various aspects of society and industry. The telegraph's impact transcended its era, shaping the trajectory of technological progress and global connectivity.

The telegraph left a lasting impact on world history, especially on society. Prior to the invention of the telegraph, communication was restricted to the speed of a horse and, in some cases, a ship.

In 1861, people could share information within minutes across great distances, and the reason behind that was the telegraph. "The speed with which people could communicate with each other increased the usage of the telegraph through the early 20th century before reaching a peak in 1945 with more than 230 million messages sent." (Sawyer, et al)

Because it was cheap and quick to communicate over long distances, settlers felt safe moving further west. Before, people were terrified of being isolated, so they stayed in big cities. but the telegraph made this fear extinguish.

News could travel faster through the lines as well, connecting people from all over and steadily shrinking the size of the world. The telegraph gave rise to the first newspaper effort to have a foreign correspondent in the field and thereby created a new type of journalist.

Even indirectly, the telegraph impacted society in a variety of ways including, westward expansion. The telegraph also had a large impact on the development of industrialization in the world. The Industrial Revolution kicked off in Britain in the late 18th century and was slow to spread westward to America. "With the telegraph, railroads became safer and a more reliable means of transportation by ensuring that trains would not collide as well as better coordinating the arrival and departure of trains." (Sawyer, et al)

As the telegraph expanded, prices became centralized, allowing for simultaneous pricing of products across different cities. Before long, New York became the financial center of the United States, which led to the growth of the New York Stock Exchange. The telegraph made it easier to find buyers and sellers for stocks and increased the money invested in the stock market.

The economic growth this generated led to development of more financial institutions that would not have been made possible otherwise. The speed of business transactions and communication over long distances also led to more businesses being able to expand beyond a singular storefront. A company could be formed, and several branches could operate from a central office. This ultimately resulted in the growth of international businesses and enhanced political diplomacy.

Telecommunications were essential to political communications both foreign and domestic. The telegraph enabled countries to communicate with each other rapidly, in some instances, to avoid international incidents that could lead to war. The telegraph also became important to strategic operations in military campaigns. Telecommunications allowed military fronts stationed miles away from each other to send communications immediately to coordinate the campaigns. With journalism's new foreign

new foreign correspondents came more public awareness about political events than ever before. Political choices started to be significantly swayed by public sentiment and continue to be to this day.

The telegraph had far-reaching impacts on all aspects of late 19th and early 20th-century life. The speed with which information could move across the country made not only the United States but also the world a much smaller place. It opened new doors to the west and created a new public awareness due to the creation of the foreign correspondent. Industrialization grew exponentially due to the telegraph.

Businesses thrived and grew, and the economy grew with them. Railroads benefited from the telegraph as well, becoming safer and more efficient. International relations relied on the telegraph for updates on foreign matters and the military could coordinate across great distances.

The telegraph paved the way for the telephone later in the century and unified people across the globe. What started as an idea eventually grew into an invention with effects that can still be seen today.

“In 2006, Western Union officially ended its telegram service after 150 years, marking the symbolic end of an era. Although the telegraph had been replaced by more convenient and advanced technologies like the telephone, fax machine, and Internet, its legacy lives on as a cornerstone of modern communication systems.” (History)

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Chapter 3

Discoveries in Science and Technology during the 19th Century

Mehdi Mohammed Kanoun

The 19th century was a pivotal time in the development of science and technology, marked by significant breakthroughs and discoveries that transformed the way people lived, worked, and understood the world around them. This century saw the emergence of new scientific theories and technological innovations that had a profound impact on human history. In the field of science, a major discoveries stand out: the germ theory of disease, developed by Louis Pasteur and Robert Koch, which revolutionized the understanding of disease causation and treatment by demonstrating that microorganisms were responsible for many diseases, including anthrax, cholera, and tuberculosis (Koch 1881; Pasteur 1885). This discovery led to the development of vaccines, antibiotics, and improved sanitation practices and significantly reduced the incidence and mortality rates of these diseases. Additionally, the cell theory, developed by Rudolf Virchow and other scientists, posited that all living organisms are composed of cells and that cells are the basic units of life (Virchow 1858). This theory has had a profound impact on the development of modern biology, medicine, and biotechnology, as it has enabled scientists to understand the structure and function of cells and to develop new treatments for diseases.

The germ theory of disease, in particular, had a significant impact on the field of medicine and biology. Prior to this discovery, diseases were often attributed to bad air, poor hygiene, or an imbalance of bodily humors. However, the work of Pasteur and Koch demonstrated that microorganisms were responsible for many diseases, leading to a fundamental shift in the way doctors approached patient care. This discovery also led to the development of vaccines, which have since become a cornerstone of public health. Vaccines have been instrumental in preventing the spread of diseases such as smallpox, polio, and measles, saving countless lives and improving global health outcomes.

The cell theory, developed by Rudolf Virchow and other scientists, posited that all living organisms are composed of cells and that cells are the basic units of life (Virchow, 1858). This theory was a major departure from the prevailing view of the time, which held that living organisms were composed of a mixture of fluids and solids. The cell theory has had a profound impact on the development of modern biology, medicine, and biotechnology, as it has enabled scientists to understand the structure and function of cells and to develop new treatments for diseases.

In the field of technology, two major discoveries stand out: the development of the Analytical Engine by Charles Babbage, considered the first "mechanical" computer in history (Babbage 1837), and the invention of the telegraph by Samuel Morse. The Analytical Engine, designed in the 1830s, was a general-purpose, fully program-controlled, automatic mechanical digital computer that could perform any calculation set before it (Babbage 1837). This machine was designed to consist of four components: the mill, the store, the reader, and the printer. The mill was the calculating unit, analogous to the central processing unit (CPU) in a modern computer; the store was where data were held prior to processing, exactly analogous

to memory and storage in today’s computers; and the reader and printer were the input and output devices (Babbage 1837). The Analytical Engine was a remarkable achievement, considering the limited technology available at the time. It was a testament to Babbage's vision and ingenuity that he was able to conceive of such a device, even if it was never built during his lifetime.

The invention of the telegraph in the 19th century marked a significant advancement in communication technology. Samuel Morse, a key figure in this development, played a crucial role in bringing the telegraph to the world. Morse's work on the electric telegraph began in the 1830s, inspired by a need for rapid news transmission after experiencing a personal tragedy((McGillem) Morse's most notable contribution to telegraphy was the creation of Morse code, a system using dots and dashes to represent characters, simplifying and speeding up message transmission. His system, utilizing a single wire for signal transmission, was a groundbreaking innovation that revolutionized communication. In 1844, Morse successfully sent the first telegraph message from Washington, D.C., to Baltimore, Maryland, with the iconic phrase, "What hath God wrought?" This historic event marked the beginning of a new era in communication, enabling coordination in various sectors like the railway system and providing critical information during the Civil War((McGillem) The telegraph, despite being eventually replaced by newer technologies like the telephone and the internet, had a profound impact on human history and society, allowing people to connect over long distances and transforming the way information was shared and received((Library of Congress).

In conclusion, the 19th century was a pivotal time in the development of science and technology, marked by significant breakthroughs and discoveries that transformed the way people lived, worked, and understood the world around them. The development of the Analytical Engine and the telegraph were two major discoveries that had a profound impact on the development of in technology . In science, developed by Louis Pasteur and Robert Koch, which revolutionized the understanding the cause of many types of diseases and treatment by demonstrating that microorganisms were responsible for many diseases and the cell theory, developed by Rudolf Virchow and other scientists, posited that all living organisms are composed of cells and that cells are the basic units of life. These discoveries and developments in the great 19 th century have laid foundations for the scientists of today and for the future, and everyday we continue to use these works whether it be to write a research paper or studying at school.

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Chapter 3

The Discovery Of The First Automobile With Internal Combustion Engine

Abdullah Al-Suhaili

Abstract

The development of the internal combustion engine was a defining moment in both technological and automotive history, dramatically reshaping transportation systems and influencing the contours of modern society. This paper examines the historical progression of the internal combustion engine from its nascent forms in the early 19th century to its adoption as the cornerstone of automotive technology. It highlights key inventors and their innovations that paved the way for practical and efficient engines, as well as discusses the broader societal implications of this transformative technology. Additionally, the paper dives into the significant challenges posed by early engines, such as environmental pollution and noise, and the subsequent regulatory and technological measures implemented to address these concerns. Through this exploration, the paper captures the profound impact of the internal combustion engine on both past and contemporary society.

The genesis of the internal combustion engine represented a seminal moment that dramatically transformed transportation, subsequently altering the course of modern civilization. Originating in the early 19th century, this innovative mechanism was not merely an incremental improvement but a radical departure from existing technology, providing the propulsion method that powered the first automobiles. By doing so, it laid the groundwork for the expansive automotive industry that would burgeon and diversify over the ensuing decades.

The narrative of the internal combustion engine begins with François Isaac de Rivaz in 1807, a Swiss inventor who created what is acknowledged as the first engine of its kind. This engine was fueled by a mixture of hydrogen and oxygen, an innovative approach for the time, and was installed in a primitive vehicle designed by de Rivaz himself (AEHistory, 2020). This initial invention though was not immediately successful, it sparked a series of enhancements and modifications that would eventually lead to more practical and efficient engines.

Throughout the 19th century, the internal combustion engine underwent significant evolution, facilitated by the endeavors of numerous inventors. In 1860, Étienne Lenoir, a Belgian engineer, developed a gas-fired internal combustion engine, which he subsequently adapted to power a vehicle. This marked one of the first instances of a vehicle driven by an engine based on internal combustion principles in a practical application (IET, 2021). Following Lenoir, Nikolaus Otto and Gottlieb Daimler made groundbreaking contributions that greatly improved the engine's design and efficiency. Otto's invention of the four-stroke engine in 1876 offered a more reliable and effective framework, which was later perfected by Daimler, who introduced the first high-speed gasoline engine (Britannica, 2021).

The adoption of Otto's and Daimler's technologies signaled a turning point, facilitating the broader usage of

internal combustion engines and setting the stage for their dominance in automobile propulsion. The introduction of the Ford Model T by Henry Ford in 1908 was emblematic of this shift. The Model T utilized a refined version of the internal combustion engine and was manufactured through an assembly line process, significantly reducing its cost and making automobiles accessible to the general public (Britannica, 2021).

Despite the transformative impacts of the internal combustion engine, the technology brought with it a host of challenges. The engines were often too noisy for the elderly and citizens, prone to breakdowns, and produced significant amounts of pollution. These issues led to societal and regulatory challenges, sparking debates over environmental impact and public health that continue to this day (ThoughtCo, 2019). Additionally, as automobiles became more common in society, safety concerns grew, influencing the development of traffic laws and automotive safety standards. The reliance on fossil fuels also intensified global dependency on oil, leading to economic and geopolitical tensions. Moreover, the emissions from internal combustion engines have been a significant contributor to global warming, prompting governments and industries to invest in alternative technologies such as electric vehicles and hydrogen fuel cells to mitigate these effects.

In conclusion, the invention of the internal combustion engine is a testament to human ingenuity and its capacity to drive societal change. From the early experimental vehicles to the sophisticated automobiles of today, the internal combustion engine has had a profound influence on technology and society. Looking forward, the legacy of the internal combustion engine continues to evolve, with innovations in efficiency and emissions reduction reshaping the future of transportation.

Chapter 3

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