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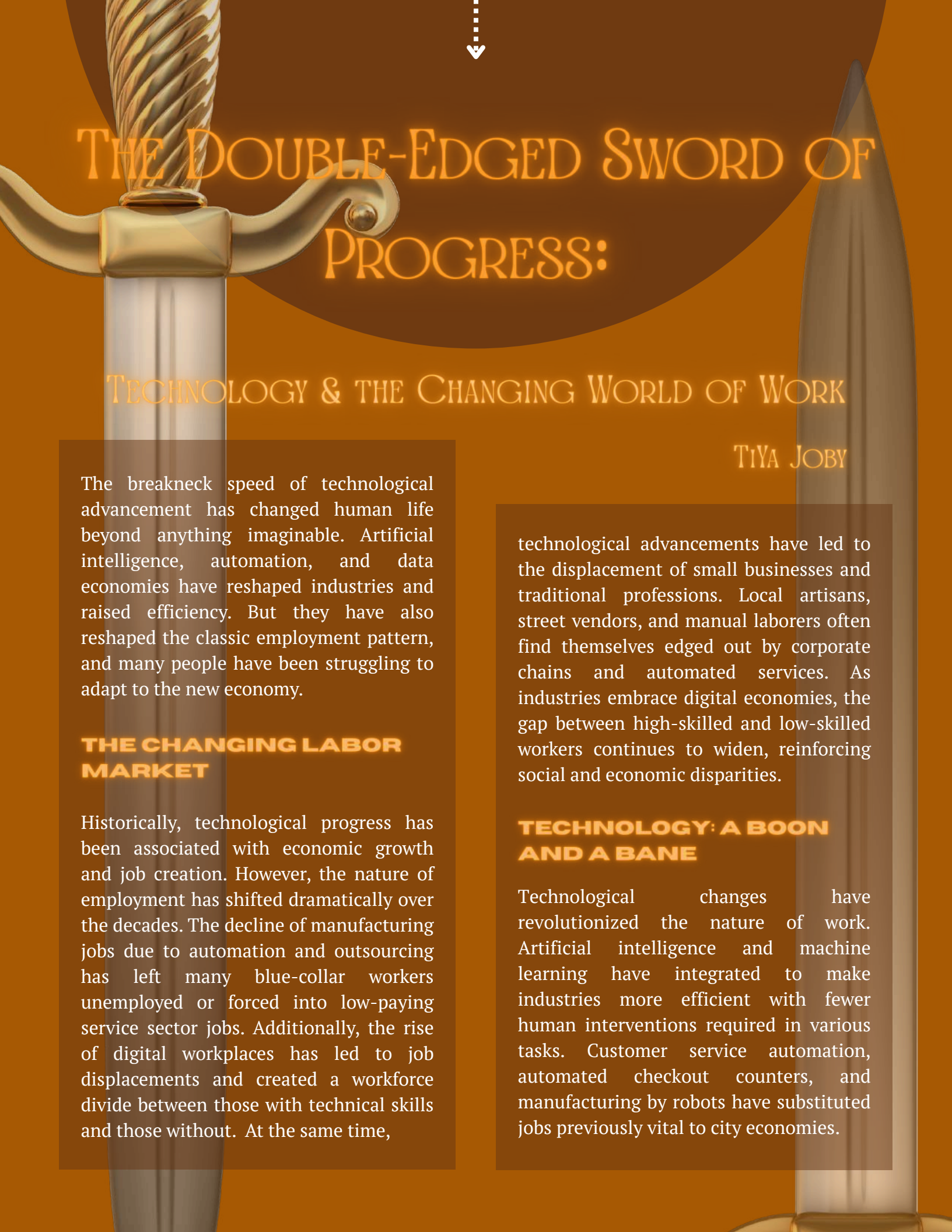
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THE DOUBLE-EDGED SWORD OF PROGRESS:

TECHNOLOGY & THE CHANGING WORLD OF WORK

TIYA JOBY

The breakneck speed of technological advancement has changed human life beyond anything imaginable. Artificial intelligence, automation, and data economies have reshaped industries and raised efficiency. But they have also reshaped the classic employment pattern, and many people have been struggling to adapt to the new economy.

THE CHANGING LABOR MARKET

Historically, technological progress has been associated with economic growth and job creation. However, the nature of employment has shifted dramatically over the decades. The decline of manufacturing jobs due to automation and outsourcing has left many blue-collar workers unemployed or forced into low-paying service sector jobs. Additionally, the rise of digital workplaces has led to job displacements and created a workforce divide between those with technical skills and those without. At the same time,

technological advancements have led to the displacement of small businesses and traditional professions. Local artisans, street vendors, and manual laborers often find themselves edged out by corporate chains and automated services. As industries embrace digital economies, the gap between high-skilled and low-skilled workers continues to widen, reinforcing social and economic disparities.

TECHNOLOGY: A BOON AND A BANE

Technological changes have revolutionized the nature of work. Artificial intelligence and machine learning have integrated to make industries more efficient with fewer human interventions required in various tasks. Customer service automation, automated checkout counters, and manufacturing by robots have substituted jobs previously vital to city economies.

In addition to that, the emergence of digital media has produced the gig economy, in which temporary, freelance, or contract labor has become prevalent. While it offers flexibility to a section of people, it also generates job insecurity, absence of benefits, and an uncertain income for many employees.

Conventional job designs, which used to provide pensions and job security, are fast becoming a thing of the past, as people are now moving towards an unsure and volatile employment scenario. And let's not forget Companies are increasingly choosing automation over human workers for several reasons, primarily driven by efficiency, cost savings, and technological advancements.

THE HUMAN COST OF PROGRESS

The transition to automation and technologically based industries has not only led to lost jobs but also to psychological and social impacts. The technological literacy gap between generations adds to the problem, as experienced workers struggle to compete in a labor market where digital skills become more important by the day.

In addition, as technology becomes increasingly advanced with artificial intelligence, white-collar employment is not excluded either. Tasks involved in legal research, finance analysis, and even the arts are being targeted by machine learning.



FINDING A WAY FORWARD

Despite these challenges, solutions exist to mitigate the negative impacts of technological progress on employment. The increased dependence on machines at work makes a new solution for education and skills acquisition inevitable in order to equip future generations to face the changing nature of work.

Governments, businesses, and educational institutions must work together to foster reskilling and upskilling programs that enable

workers to transition into new roles. Investments in vocational training and lifelong learning opportunities can help bridge the gap between traditional and emerging job sectors.

Furthermore, policies that provide equitable wages, social security, and labor protections for workers in the gig economy are essential. Ethical principles should inform technological integration so that automation supports human labor instead of substituting it. Economic planning must also be inclusive, harmonizing technological advancement with the interests of local communities.



Technological development has undoubtedly shaped a new world of possibilities, but it has also introduced challenges that cannot be ignored. While progress is inevitable, it must be navigated with care and foresight to ensure that human livelihoods are not sacrificed in the pursuit of efficiency. The future of work depends on how societies adapt to these changes—ensuring that technology serves humanity rather than rendering it obsolete.

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IS CIVILIZATION LOSING MOMENTUM?

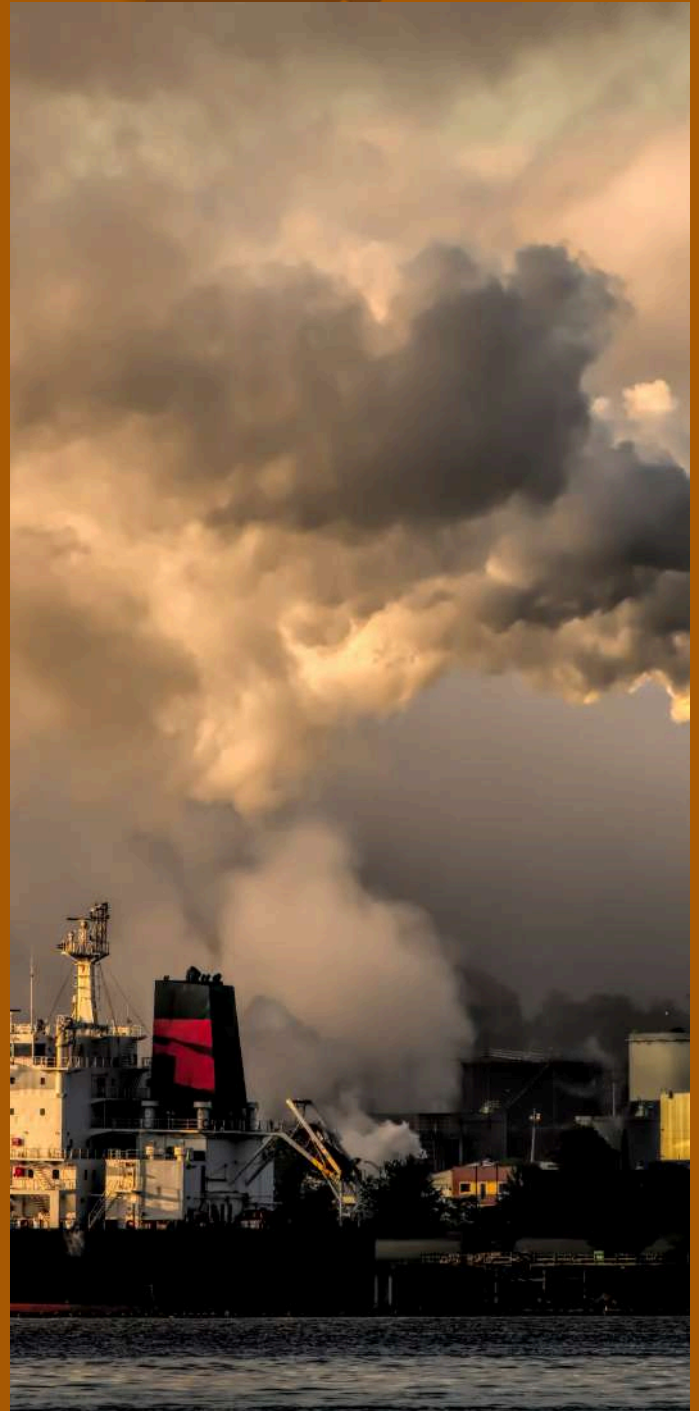
THE CHANGING PACE OF PROGRESS

FELIX

After decades of breakneck growth, lifting billions out of poverty, some believe that the golden age of civilization's progress is over - are they right?

Life for most of human history was brutally difficult, by modern standards. Before the Industrial Revolution, many historians believe that more than 90% of people lived in extreme poverty, meaning that they spent about \$2 equivalent - one thirtieth of the median daily consumption in the US today, and means that they were "unable to meet basic needs (including minimal nutrition and adequately heated shelter) according to prices of locally available goods and services".

It's hard to imagine the difficulty of life before industrialization - when diseases that are now eradicated thanks to advancements in vaccination or have been rendered harmless by modern medicine were prevalent, and 50% of children died before reaching puberty because of the constant danger of life. Access to food depended heavily on the success of harvests, and famine was common, as was conflict, drought, and labor conditions that would now be considered thoroughly inhumane.



Since then, industry and science have driven society forward through revolutionary discoveries, such as harnessing electricity to power modern life and antibiotics to combat deadly bacteria. Equally important, though less glamorous, were innovations like production lines and the mechanisation of farming. These advances freed up labor for science and innovation, enabling each generation to enjoy a markedly better quality of life than the one before. However, this force of progress and optimism seem to have slowed, at least in the Western world, as commentators begin to fear a 'great stagnation'

and slowdown of development. Compared to the mid-20th century, when a manned spacecraft in Apollo 11 landed on the moon and passengers of the Concorde soared across the Atlantic in as little as 3 hours, feats that we struggle to repeat even today, it seems sensible to say that progress has slowed down. However, although many have argued that the world's "special century" ended in 1970, and we have been in a period of progressive slowing-down and stagnation since then, I believe that the issue is more nuanced than this, especially when we consider the world as a whole rather than just our own lives.



Around the world, after a brief stagnation in the early 1990s, inflation-adjusted GDP per capita, which measures the value of goods and services produced for each person on Earth, has soared, almost doubling from 1993 to today. While the impacts of this are less noticeable in high-income countries, whose outputs have increased by a comparatively meagre 67% in the same time, this has meant that hundreds of millions of people in poorer countries have been lifted out of poverty, as output in China has increased 22x (2300%) in the 30 years from 1993 to 2023. This era represents a different kind of civilizational progress - of movement towards global equality, rather than progress for the world's wealthiest nations, for the first time in the past few hundred years, if not more.

This presents a series of challenges to our civilizations, along with the immense opportunity inherent in progress towards equality - moving us towards a truly meritocratic world, where every one of us has the chance to be successful. Yet, as more people around the world gain access to these comforts, new challenges arise—particularly in sustaining this growth while minimizing environmental impact. The expanding consumer classes, particularly in China and India, increasingly enjoy the comforts that were once exclusive to the wealthy, such as intercontinental air travel and constant access to the latest technology and fashion. To satisfy this demand, more oil, rare-earth metals, and factories than ever before will be needed, which will challenge the ongoing green transition.

However, the optimistic side of me hopes that these challenges can be overcome by civilization. The peak of global CO2 emissions is believed to be fast approaching, if it has not already been reached, and as long as we can manage this growth in a stable manner, future generations will be able to reflect on our era as a time of fairness, opportunity and perhaps egalitarianism. Scientific inventions have certainly slowed down, but now it seems possible for the majority of the world to finally have access to the fruits of the scientific 'golden age', like vaccines, electricity and a reliable food supply for all, and for that reason alone I believe that this is truly a time of monumental progress.



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THE EVOLUTION OF MEDICAL INNOVATIONS

FROM ANCIENT REMEDIES TO MODERN BREAKTHROUGHS

WINNIE

Throughout history, medical innovations have played a crucial role in shaping human health and longevity. From early herbal remedies to cutting-edge biotechnology, the evolution of medicine tells a story of continuous discovery and improvement, leading to the advanced healthcare systems we rely on today.

ANCIENT FOUNDATIONS OF MEDICINE

The earliest known medical practices date back to ancient civilizations. The Egyptians developed some of the first surgical instruments and documented medical procedures in the Ebers Papyrus (circa 1550 BCE). In ancient China, traditional Chinese medicine, including acupuncture and herbal treatments, was widely practiced, while Greek physician Hippocrates (often called the 'Father of Medicine') established foundational medical ethics and the concept of disease as a natural process. In India, Ayurveda emerged as a holistic system of medicine, emphasizing balance and herbal treatments.



THE SCIENTIFIC REVOLUTION AND MEDICAL ADVANCES

The Renaissance and Scientific Revolution brought a renewed focus on medical research. Andreas Vesalius's *De Humani Corporis Fabrica* (1543) revolutionized the understanding of human anatomy, while William Harvey's discovery of blood circulation in 1628 laid the foundation for modern cardiovascular medicine.

The 18th and 19th centuries saw significant advancements in immunology and microbiology.

Edward Jenner's development of the smallpox vaccine in 1796 was a landmark moment in preventive medicine. Later, Louis Pasteur's germ theory and Joseph Lister's antiseptic techniques drastically improved surgical outcomes and reduced infection rates.

THE 20TH CENTURY: A NEW ERA OF MEDICAL INNOVATION

The 20th century witnessed a medical revolution. Alexander Fleming's discovery of penicillin in 1928 introduced the era of antibiotics, saving millions of lives. The development of vaccines for diseases such as polio, measles, and hepatitis significantly reduced mortality rates worldwide.

The advent of medical imaging technologies, including X-rays, MRIs, and CT scans, provided unprecedented insights into the human body. Organ transplantation, pioneered in the 1950s and 60s, opened new possibilities for treating previously fatal conditions. Meanwhile, advancements in genetics, including the discovery of DNA's structure by Watson and Crick in 1953, paved the way for personalized medicine and genetic therapies.

THE PRESENT AND FUTURE OF MEDICINE

Today, medicine continues to evolve at an unprecedented pace. Breakthroughs in biotechnology offer potential cures for genetic disorders.

Artificial intelligence is enhancing diagnostics, and telemedicine is improving healthcare accessibility. Research into regenerative medicine, including stem cell therapies and lab-grown organs, holds promise for the future of treatment and recovery.

The push for more effective treatments for cancer, neurodegenerative diseases, and global pandemics drives ongoing medical research. With the integration of nanotechnology and AI, the next frontier of medicine may include precision treatments tailored to individual patients, further improving health outcomes.



CONCLUSION

The history of medical innovations is a testament to human perseverance and ingenuity. From ancient herbal remedies to revolutionary gene-editing technologies, each discovery builds upon past knowledge, shaping the future of healthcare. As we look ahead, the continuous pursuit of medical advancements ensures that medicine will keep evolving, improving lives and pushing the boundaries of what is possible in healthcare.

HISTORY OF THE ATOMIC BOMB

JULIA DE GUZMAN

Atomic bombs, on a larger scale, developed because of the threat of Nazi Germany to the United States during the Second World War. The Germans first discovered nuclear fission– the practice of splitting atoms, which in turn release neutrons that induce fission and release more neutrons, thus causing a chain reaction– and Hungarian physicist Leo Sziliard urged Albert Einstein to warn U.S. President Franklin D. Roosevelt about the dangers of nuclear weapons in 1939. In 1941, Roosevelt agreed to the development of the atomic bomb, and facilities to develop the bomb were established in Oak Ridge, Tennessee, Hanford, Washington, and Los Alamos, New Mexico.

Scientists on the Manhattan Project used two paths to develop the bomb. One path was to use uranium-235, an uncommon isotope of uranium. The uranium path posed a challenge because it is less than one percent of naturally occurring uranium and has to be physically isolated. Bombs using uranium-235 where a mass of uranium-235 is fired like a gun to another mass to start the reaction. The other path used plutonium, a recently discovered element that could be produced in a nuclear reactor.

In 1942, physicist Enrico Fermi succeeded in producing and controlling a fission chain reaction in a reactor, and in 1945 plutonium became readily available from the Hanford Nuclear Site. Plutonium bombs are called implosion fission bombs because they are surrounded by explosives that compress the plutonium. The actual building of the bomb took place in Los Alamos; the operation was overseen by J. Robert Oppenheimer (Britannica).

SUCCESS OF THE ATOMIC BOMB

The first atomic bomb was detonated at 5:30 AM on July 16, 1945 in New Mexico; it was a plutonium implosion bomb. Upon the success of the first detonation, they were then used to end the Second World War in the Pacific Theatre, the bomb dropped on Hiroshima being a uranium bomb and Nagasaki being a plutonium bomb. Japan surrendered soon after; thus proving the atomic bombs were an effective deterrent to war.

However, the bombs also devastated Hiroshima and Nagasaki. In Hiroshima, about 70,000 people were killed instantly, and two thirds of the city was destroyed.

In Nagasaki, 40,000 people were killed instantly, and 40% of infrastructure was destroyed. Many more people in both cities died later due to radiation poisoning or injuries. After Manhattan Project physicist Philip Morrison traveled to Hiroshima to study the effects of the bomb, he called it a “preeminently a weapon of saturation,” and said “defense [against it] was hopeless.” Additionally, radiation sickness killed many in the short term; quickly, the negative effects of these weapons became apparent.

FUTURE PROGRESSION OF NUCLEAR WEAPONS

Both the U.S. and the Soviet Union stockpiled nuclear weapons during the Cold War, but over the years countries have tried to move away from nuclear weapons. Only nine countries- Russia, the United States, China, France, the United Kingdom, Pakistan, India, Israel, and North Korea currently have nuclear weapons. Many other countries abandoned their research into nuclear weapons because of funding deficits, or it did not have any benefits (Roser et al).

Some countries, like Ukraine, gave up their nuclear weapons in exchange for protection from global powers. Over the eighty years since the atomic bombs were dropped on Hiroshima and Nagasaki, treaties have been put in place to limit the spread and usage of nuclear weapons, like the Nuclear Non-Proliferation treaty of 1968 and the Treaty on the Prohibition of Nuclear Weapons of 2017 (Britannica).



EFFECTS

The atomic bomb's effects are very destructive in many areas. The initial blast causes destructive blast effects like chemical burns, and the bomb's blast wave causes air overpressure that can destroy windows and level commercial buildings. In Hiroshima, a firestorm formed because of the atomic bomb that developed into a giant fire causing more damage. It also causes lethal nuclear fallout, which consists of fission products whose isotopes exceed the half-life of the bomb, which can last for days or weeks. Even though Hiroshima and Nagasaki are no longer radioactive, the survivors experience other adverse side effects. Two thirds of Hiroshima survivors experienced flash burns caused by the thermal flash of the explosion– or a fireball of air radiating light and heat (Wolfson).

Leukemia is the most prevalent effect on survivors. The Radiation Effects Research Foundation estimates the difference between affected survivors and the unaffected population's risk of leukemia to be 46% for bomb victims (Listwa). According to the Red Cross, the rates of leukemia increased among survivors after five or six years, and cancers like thyroid and lung cancer develop at a rate above the normal.

ETHICS

The two chief arguments surrounding nuclear weapons are for deterrence and disarmament. Deterrence is the idea of keeping nuclear weapons to intimidate other parties to not attack a country due to the threat of retaliation, and is essential to the United States' foreign policy. Disarmament is the complete elimination or reduction of nuclear weapons. Arguments for deterrence claim that states have the right to defend themselves from threats using nuclear weapons, and disarmament is improbable in the near future. Arguments for disarmament take a moral ground, stating that nuclear weapons put civilians' lives in danger, the presence of nuclear weapons implies a persistent state of war and not peace, and nuclear weapons' environmental consequences.

CONCLUSION

Oppenheimer said of the atomic bomb, "I think when you play a meaningful part in bringing about the death of over 100,000 people and the injury of a comparable number, you naturally don't think of that as—with ease." (Giampaolo). Although the development of the atomic bomb was scientifically groundbreaking, it also led to political turmoil as well as a way to cause mass destruction on environments and humans.

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IS GLOBAL POLITICS DOING EVERYTHING IN ITS POWER TO HONOR ALL CIVILIZATIONS' UNCOMMON HISTORY?

ANGEL

The world is full of legacies left behind by ancient civilizations that have brought about humankind's scientific achievements, philosophic development, and evolution in culture. From Mesopotamia to Mayans, Vikings to the Indus Valley, humankind is an embroidered canvas full of various traditions, inventions, and histories. As countries interact in this era of globalization to an unprecedented extent, political institutions and international organizations should naturally take affirmative steps to keep alive, celebrate, and inform the world about these diverse legacies. But things go otherwise in reality. Though affirmative steps are being implemented to achieve various legacies by acknowledging and respecting these legacies, international politics is shortfalls in giving equal recognition to every legacy by Eurocentrism, political motives, and economic objectives taking over an inclusive recognition of worldwide legacy.

THE EUROCENTRIC SUPREMACY IN HISTORY

One of the most glaring gaps in international affairs in discussing world history is Eurocentrism. Western society in general, ancient Roman and Greek society, the Renaissance era, and Europeans colonization get featured in most international discourses regarding history. Although these centuries and continents have certainly shaped modernity in every aspect, these have not shaped mankind independently. Civilizations such as the Mali Civilization, Khmer Civilization, and Australian Aboriginal civilizations have just as interesting histories to present, yet these go unheard in international affairs.

International institutions such as UNESCO strive to maintain world heritage sites and to educate about history. Western perceptions, however, continue to decide which locations and events receive international acclaim to

this present day. Numerous cathedrals in Europe and castle sites have been added to the World Heritage List while sites of equal significance in non-globally powerful cultures have been disregarded in the past. This Eurocentric outlook can result in an incomplete perspective in which non-European accomplishments fall behind or remain unnoticed.

POLITICAL AGENDAS AND PARTIAL ACKNOWLEDGEMENT

The celebration is in most instances bound up in political agendas and thus amounts to partial endorsement of certain civilizations to the neglect of others. Nations and elites in power have a tendency to celebrate things about history that cohere to nationalism or geopolitical ends while hiding uncomfortable truths. Colonized histories, e.g., get sanitized or downgraded by ex-colonizers while aboriginal histories get marginalized.

In some contexts, history is employed to pursue political aims. Government can propel interpretations in order to legitimate claims to territory, to validate patriotic ideologies, or to silence opposition. China's "5,000 continuous centuries" is patriotic in this way in providing an emphasis to continuous centuries insofar as it is employed to claim dominance over cultures. Russia's interpretations of unity between races of Slavic origin and imperial inheritances is employed to legitimate geopolitical aims in an

equivalent way. Political aims most regularly interfere with an equalized and balanced perspective towards worldwide history because countries prefer to value their own perceptions over an inclusive worldwide perspective.

THE ROLE OF GLOBAL INSTITUTIONS

International organizations such as the United Nations, UNESCO, and the International Council on Monuments and Sites (ICOMOS) have a key role to maintain the world heritage in tact. Organizations such as the World Heritage Convention and exchange programs have been put in place to aid in diverse histories. Nonetheless, these institutions have yet to cease being political in perspective. UNESCO has been censored in the past regarding politicism where member states have been known to campaign to have recognition attributed to their own heritage while disregarding geopolitical rivals.

Despite these setbacks, things have been getting better. Repatriations of stolen artworks in colonial-era museums have accelerated over the last decade. Greece, Nigeria, and Egypt have been demanding repatriations of artworks such as Parthenon Marbles and Benin Bronzes looted during colonialism. As institutions have been repatriating these artworks, opposition by powerful Western institutions is proof that this struggle to have equal recognition in books is ongoing.

ECONOMIC AND TECHNOLOGY CONCERNS TO CELEBRATING HISTORY

Another factor in universal remembrance is economic inequality. Wealthy nations have money to invest in guarding and sharing their ancient sites, whereas poorer nations hardly maintain their heritage since they have nothing to work with. Numerous ancient sites in developing economies fall by the wayside, ravaged by nature, ravaged by war.

Technology has been employed to influence interpretations in the past too. Developments in virtual reality visits to museums, online classes, and digital archiving have brought accessibility to information about the past to an unprecedented level. However, most online content is biased towards Western perceptions because institutions in developed nations have superior resources to invest in equipment to place content online. Steps should be put in motion to fund digital archiving projects in overlooked corners.

A PATH TO UNIVERSAL ACCEPTANCE

If global politics is to properly celebrate each society's unique histories, something is bound to change. First, school syllabuses worldwide have to be redesigned to better balance international history. Schools must learn about African empires, empires in Asia, Indigenous society, in just as rich ways in which presently they now get to learn about Western society.

Second, international organizations should strive to achieve greater equity in support and recognition of heritage. UNESCO and organizations should strive towards equal attention and preservation towards heritage sites and histories in not-so-powerful nations. Financial assistance should be sent to aid developing nations in protecting ancient sites and relics.

Third, cultural exchanges can be expanded to achieve greater awareness and respect towards diverse histories. Mutual excavations by excavators, cooperation by institutions, and academic investigations by researchers with diverse orientations can shape an inclusive history.



Finally, repatriation should continue to restore these artefacts to these owners. Western institutions continue to possess looted art in their collections to remind these injustices in history. Returning these artefacts and acknowledging these civilizations' histories is an integral part in rectifying these injustices towards genuine historical appreciation.

Conclusion While there is an attempt to celebrate each civilization's histories, international politics is free of equal respect. Eurocentrism, political motives, economic dissimilarities, and dissimilarities in technology all result in unequal respect to legacies. If rich legacies of the world have to be paid respect seriously to, an attempt has to be made consciously to gain inclusivity, repatriate looted antiquities to where they deserve to go, support developing nations in protecting their heritage, and rearrange international education to incorporate an inclusive vision. Only by this can mankind gain full value to collective pasts and have every civilization get respect that is owing to it.



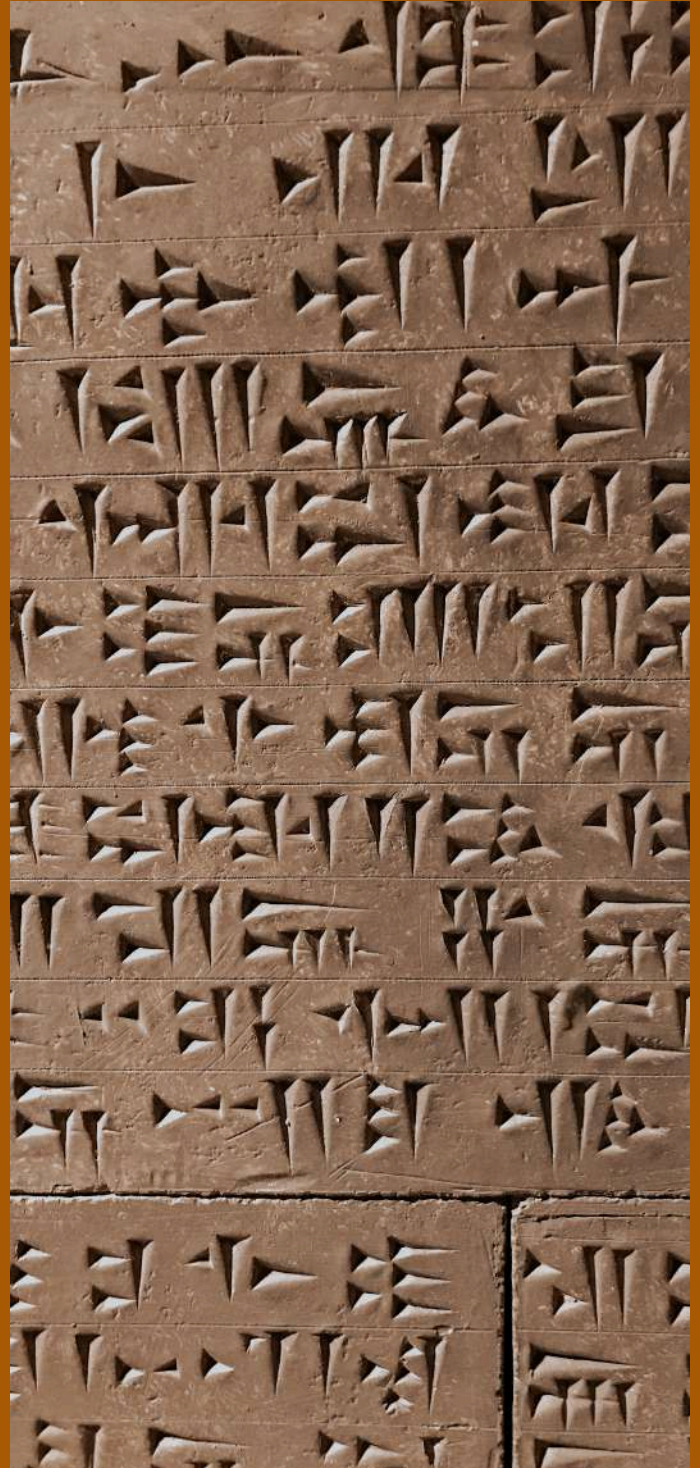
THE MOST INFLUENTIAL DISCOVERY WHICH IMPACTED CIVILIZATION

ANGEL

When we think about development in humans, inventions arise—electricity, the printing press, the global computer system known as the internet, vaccines, and cultivation. Under each of these inventions is one key invention that has shaped humankind beyond everything: written language.

The ability to document, disperse, and maintain knowledge has been behind each development in civilization. As knowledge was transmitted orally by an earlier generation before writing was developed, this was liable to get distorted or lose during transmission in the process. When humans developed writing, discoveries, laws, practices, and myths now got retained in original documents to prevent knowledge loss while expanding upon it. Progress was now achieved by writing where civilizations expanded beyond a generation.

One of the earliest systems to have been used to write is cuneiform that emerged in Mesopotamia around 3100 BCE. Initially used informally to keep records about farm life and trade, cuneiform gradually began to incorporate laws, literature, and philosophy not long after.



Egyptian hieroglyphs and Chinese script emerged around this era, each serving an integral role in each society. All these scripts ushered in an era where prehistoric society gave rise to organized society where detailed governance, economic planning, and growth in culture was possible to take form.

Writing didn't just simplify administration—it altered the way humankind thought about the universe. Rules, such as Hammurabi's Code, now became tractable to put in black-and-white and systematize to ensure that fairness was not random but tied to known rules. Scriptures, such as the Vedas, the Torah, later the Bible and Quran, now became tractable to maintain in tact and transmit over vast distances to

inform moral and ethical systems in communities across the land. Philosophical contemplation and scientific investigation flourished because thinkers now wrote down their thoughts, critiqued others' work, and built upon centuries of accumulated knowledge. One of the most powerful impacts of writing was in educating. Learning was limited to experience by word and hand before this development. Written books carried wisdom to more individuals, leading to institutions in the shape of libraries and schools. Ancient libraries like Library of Alexandria turned to repositories where books by various civilizations have been stacked and intellectual debates have been fostered. Writing carried wisdom to humans over centuries that brought achievements in mathematics, medicine, astronomy, and building.

The influence of writing expanded dramatically with the invention of the printing press in the 15th century. Before Johannes Gutenberg's press, books were laboriously copied by hand, making them expensive and rare. With printing, knowledge became widespread and more accessible, fueling the Renaissance, the Scientific Revolution, and the Enlightenment. Suddenly, information could spread rapidly, ideas could challenge the status quo, and literacy rates soared. The impact of this cannot be overstated—scientists could share their discoveries, philosophers could debate their theories, and the general public could educate themselves beyond the constraints of elite institutions. Fast forward to present times, pen is in the background taking things forward. And most revolutionary modern technology is most likely born out of nothing short of written word. We have e-mail, e-books, scholarly articles to keep things archived and traded to unprecedented extents. One can now have in his hands mankind's collective wisdom in keyboard key presses—something unimaginable in three centuries. Scientific investigations, documents in judicial life, contracts in life in business, and art continue to be reliant upon written word to run.

Beyond its functional purposes, writing has significantly influenced both human identity and society. Literature has provided humanity with the capacity to experience intricate emotions, to document historical events, to imagine alternate universes, to share in experience through both time and space. From plays by William Shakespeare to novelistic masterpieces in modern times, writing has been an engine for story. It has preserved voices that have been dead centuries by now and inspired future voices to join in. It has been an essential part in social movements because powerful language has the power to defy oppression, to diffuse revolutionary thought, to fight for fairness.

Despite the pace with which technology has advanced, by-passing is not yet by-passing. Though video, audio recordings, and computer programs continue to change communication, written word is most trustworthy to keep things in memory. Rules, contracts, scholarly work, and books ride upon writing to keep things in order and to keep things around eternally. Computer programming—computing's backbone—is nothing short of written word that enables modern computing to take shape.

Some might suggest that modern medicine, electricity, or agriculture is more essential an innovation, yet none of these would have been achieved without writing. Agriculture created the possibility to settle down and multiply, yet writing made it easier to regulate, exchange, and cultivate scientific ways to better cultivate.

In many ways, writing is man's DNA. It has led mankind beyond survival to advanced, thriving communities. It links present to future and to the past by not making each experience, each lesson, each breakthrough forgotten but passed down. If not through writing, each generation would have to struggle in darkness because each generation wouldn't have been in a situation to capitalize upon others. As we continue to march forward, writing is always going to be required. Whether in books, computerized databases, or yet unknown to man forms in the future, the power to put thought to paper is always going to remain the driving power behind mankind's development. Technology can certainly have an influence upon the way in which we process written material and write, yet value in written material can always be maintained. It is mankind's most powerful tool—selecting the key that unlocked society and forged its future to this point.

Electricity drives modern life, yet only because written documents, scientific articles, and engineering drawings made its finding and development viable. Vaccines have been responsible for millions of deaths not occurring, yet unless through written doctoring, scientific trials, and dissemination methods had been developed, they wouldn't have been created, tried, and disseminated efficiently.



THE EVOLUTION AND IMPACT OF THE WHEEL:

FROM ANCIENT ENGINEERING TO
MODERN TECHNOLOGY

AIZA

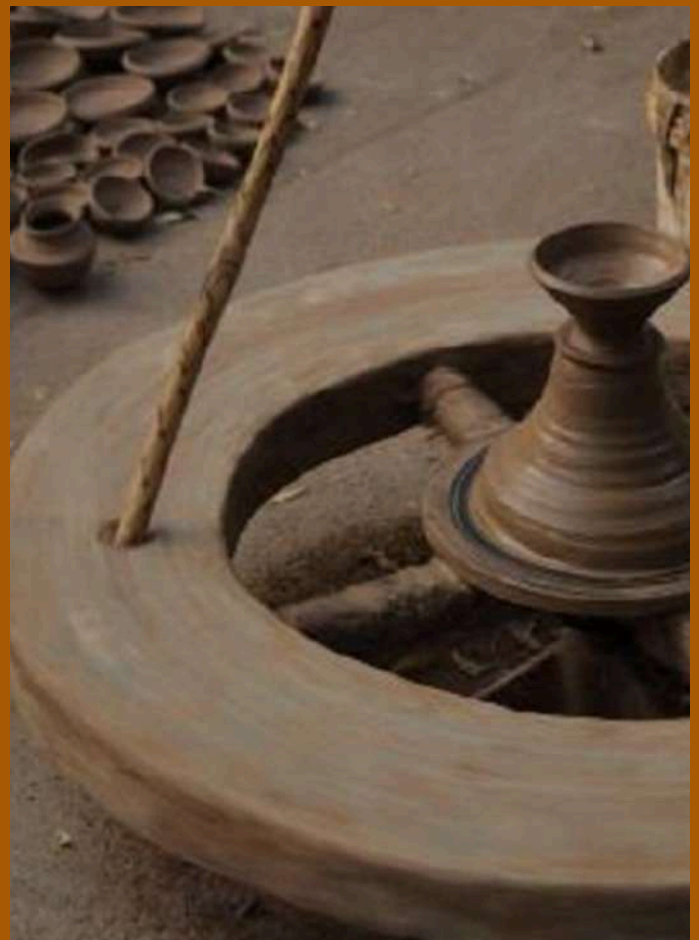
INTRODUCTION

One might ponder what inspired the mind that first conceived the idea of a wheel for a potter's machine— an invention that would later become the cornerstone of countless technological advancements. Wheels remain an unsung force behind many of the luxuries we take for granted in daily life. Take, for instance, the vehicle—arguably the most significant creation born from the wheel- revolutionizing how we travel. It is essential to delve into the history of the wheel's evolution and examine how its progression has been intricately linked to its profound impact on civilization.

THE ORIGIN OF THE WHEEL

We know wheels primarily for their use in transportation, but in ancient times they were first used as a potter's machine for making pottery. The instance of the creation of a wheel is not known, so it is believed that the wheels were created long before records were written.

However, the ancient Mesopotamian people are widely believed to have invented the wheel around 4200- 4000 BC. It is likely to have also been invented independently in China, around 2800 BC (Barfield, 2020).



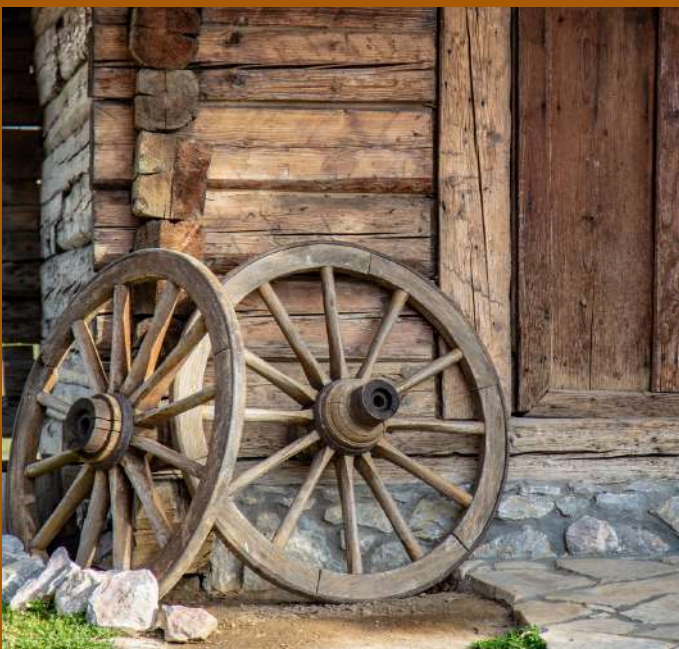
EARLY ENGINEERING OF THE WHEEL

Because of the principle of the working of a wheel with an axle, the wheel became a supporting pillar in so many ancient and modern inventions. The principal relies on reducing friction by allowing a smaller axle to rotate along with or independently of the larger wheel, making movement smoother and requiring less effort. Essentially, the wheel and axle act as a simple machine that amplifies force, making it easier to transport heavy loads over long distances (Bellis, 2024).

In the earliest carts, the wheels and axles turned together. The sledge was secured with wooden pegs to prevent it from moving while resting on the rollers. The axle and wheels produced all of the movement as it rotated between the pegs. (Bellis, 2024) This development reduced friction and allowed carts to move smoothly, increasing speed and making transportation of goods and people easier.

The wheels were fastened to the axle on both sides (Bellis, 2024). This made transportation of heavy loads easier and planted the idea of advanced means of transportation, i.e., airplanes.

Moreover, wheels enabled the efficient utilization of natural resources by powering early watermills and machines, making resource consumption more convenient and productive.



One of the earliest practical applications of the wheel and axle principle was the invention of waterwheels. A series of pots were tied to the rim of a wheel that was driven to rotate about a horizontal axis by running water or a treadmill. The lower pots were submerged and filled in the running stream; when they reached their highest position, they poured their contents into a trough that transported the water to the fields. These early waterwheels were used to raise water from a lower to a higher level for irrigation. (The Editors of Encyclopaedia Britannica, 2025). This invention played a pivotal in transforming irrigation, laying the foundation for modern irrigation methods. It also facilitated the fair distribution of water among communities and maximized agricultural production while serving various domestic purposes.

THE WHEEL IN MODERN TECHNOLOGY

In the modern era, Wheels are utilized to a far greater extent than in ancient times. The invention of the wheel has shaped the modern age, leaving an indelible mark on the course of human progress. Wheels played a pivotal role in the industrial revolution, facilitating trade and agriculture, reducing physical labour, and increasing productivity. They enabled faster global travel and were essential in spinning wheels and mills for material processing. In the early 1800s, Charles Goodyear pioneered vulcanized rubber, leading to the first commercially successful rubber tires in the 1840s. Modern rubber tires consist of key components: the tread ensures traction and durability, the sidewall provides flexibility and protection, body plies reinforce strength, and the bead secures the tire to the wheel. These elements work together to enhance tire performance and longevity. (Seoteam & Seoteam, 2023). Wheels have become an integral part of modern life, with transportation now easily accessible for various purposes. Whether it's for education, work, or leisure.



ENVIRONMENTAL CONCERNS

On the other hand, wheels have contributed to environmental pollution, primarily due to carbon-emitting vehicles, as larger wheels require more fuel and result in poor fuel economy. Some high performance or alloy wheels require special care and are expensive to maintain. While the rubber rings beneath your car may seem benign — one advertising campaign used to feature babies cradled in tires — they are, experts say, a significant source of air, soil, and water pollution that may affect humans as well as fish, wildlife, and other organisms. (Robbins, 2023). According to the Tyre Collective, tyre wear is now the second-largest microplastic pollutant after single-use plastic. In Europe alone, more than a million tonnes of tyre particles are produced each year, ending up in waterways, in oceans, on plates and inside lungs. (Eliseev, 2022). As wheels contributed to environmental challenges like pollution and resource depletion, strategies have emerged to mitigate these effects. Wheels should be developed from sustainable materials like biodegradable rubber. (WWF, 2021). Reduce fuel consumption by low resistance designs of tires, and recycling old tires into construction materials and playgrounds. (Herbez et al., 2025)



CONCLUSION

The world would be remarkably still without wheels. Traveling to another continent would have been nearly unimaginable, making the pursuit of some dreams a much longer journey. The industry would have stagnated, and humans would be left relying on limited resources like water and clothing, with exploration of the world feeling like an unattainable dream for the average person—life would be far from the convenience we know today. While it has connected distant places, it has also accelerated consumerism and lifestyle disparities. The wheel therefore stands as both a symbol of human progress and a challenge requiring sustainable innovation.



TOUCHES OF ANTIQUITY:

LASTING LEGACY OF ANCIENT CIVILIZATIONS IN MODERN POLITICS

HAMRITHA C.V.

The conventional political tapestry woven by complex networks of governance, legislative bodies, and perceptual clashes, often appears as an outcome of modern-day ideologies intersecting with historical evolution. However, beneath the facade of modernity exists the inevitable impressions of ancient civilizations. Their instigating ventures in governance, philosophical movement maneuvering justice and power and the very fundamentals of law and order continue to align and remodel the way a civilization operates beginning from hierarchies of organization to exertion of authority. This report explores the significant influence of distinguished, renowned ancient civilizations, namely Greece, Rome, ancient China and ancient India - on modern political dynamics, demonstrating that the pages of the past are not mere historical myths but leading trails connecting the fabric of present political landscape.

THE ATHENIAN BEACON FUELING DEMOCRACY AND CIVIC ENGAGEMENT

The city-state of Athens dating back to

the 5th Century BCE was instrumental in a comprehensive political innovation: modern-day democracy. While constrained by modern impositions, the Athenian demokratia- rule by and of the people- introduced pioneering concepts like citizen involvement in crucial decision-making affairs through a representative Ecclesia (assembly), the foundation of equality over the ethical and moral conventions (isonomia), and the use of sortition to select officials. The insightful discussions in the agora (public square) fostered the essence of meaningful civic engagement and dialogue, which are key constituents of operational democracy. The Athenian introduction was the well-constructed, early engine of democratic origins, though rudimentary, the values of combustion they established propel the sophisticated vehicles of today's administration.

This corresponds to the present-day emphasis on citizen participation such as right to vote and public discourse in a democratic environment, with concepts like referendums and initiative reflecting direct involvement of citizens as in ancient Athenian ruling bodies.

THE ROMAN'S ARCHITECTURE OF LEGISLATIVE FOUNDATIONS

The Roman Republic (established c. 509 BCE) presented a different, yet plausibly impactful model. Its emphasis on the *res publica* - "the public thing"- created the groundwork for republicanism, a framework where power is restricted to elected officials, rather than a self-assumed monarch. The Romans developed radical legal frameworks, most notably the Twelve Tables (c. 450 BCE) and the later *Corpus Juris Civilis* under Justinian I (6th century CE), which propagated the value systems of law of conduct, property rights, and contractual agreements. Their administrative strengths allowed them to organize a vast empire, developing systematic bureaucratic frameworks that were inherited by successive empires and modern state governance. The ideologies of the rule of law, legal codes and jurisprudence are still relevant to major Western systems directly descending from Roman intuitions.



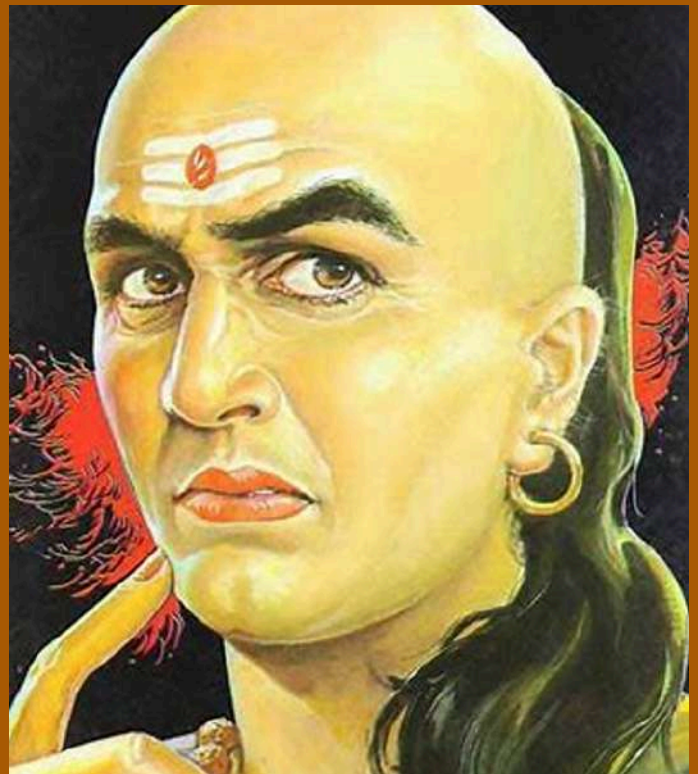
EASTERN INTELLIGENCE OF ORDER, ETHICS AND STATECRAFT

While Greece and Rome saliently dominated Western political drifts, ancient Eastern civilizations have left behind an impactful legacy of wisdom. In ancient China, Confucianism (founded by Confucius, c. 551-479 BCE) reinforced public harmony, an order of hierarchy and substance of ethical leadership, morality and meritocracy in governance. Legalism adversely debated for stringent laws and centralized power units to govern the territory. The concept of the Mandate of Heaven provided a robust infrastructure for legalizing rulers and backed dynastic transitions based on their ability to deliver justice and rightful governance. These roots are evident in some East Asian political systems via Confucian deals, centering on social harmony and regard for authority. The ongoing controversies of strong state versus individual liberties emphasize the historic tensions between Legalism and Confucianism.



Ancient India, particularly during the Mauryan reign (c. 322-185 BCE), offered the Arthashastra, a skillful dissertation of statesmanship, economic policy-making and military planning attributed to Chanakya (Kautilya). This highly relevant piece of work offered invaluable inputs into realpolitik, diplomatic relations and intricate elements of governance, influencing political executions with a dimension of reality on informed decision-making and state management.

However, it is vital to address that ancient civilizations also offer cautionary examples of the past. The rise and fall of empires embellished by authoritarianism, civil unrest and oppression of individual privileges provide historically proven examples of unregulated power. The transition from Roman Republic to the Empire, demonstrates the volatility of republican institutions in realms of ambition and political dynamics.



CONCLUSION

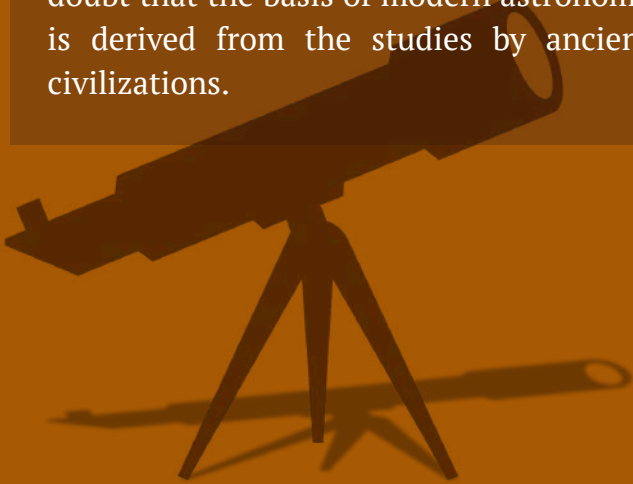
The political era we traverse today is not solely the aftermath of recent history. The innovative thoughts, lasting legal bodies and philosophical quests of ancient civilizations have laid a solid foundation upon which modern political systems function. From Athenian ideals to Roman instincts, Confucian values to Arthashastra's Pragmatism, the echoes of the past oscillate in our contemporary political affairs. By understanding ancient origins, we gain a deeper appreciation of nuances of modern politics and the indelible legacy of those who first dappled with fundamental questions of societal order. The footprints of these ancient affluents remain deeply etched in the fields of politics, guiding and cautioning us as we navigate an advancing political terrain.

STORIES OF THE STARS:

ASTRONOMY IN ANCIENT CIVILIZATIONS

AAMNAH YOUNUS

Humankind's fascination with the shining celestial bodies is not a new concept. In fact, it can be dated back to century old civilisations who's advanced inventions have made today's life much easier. These people focused much on observing the space and its activities that occur in the sky. Even then, the research in different societies and cultures were done differently producing vast results. It is no doubt that the basis of modern astronomy is derived from the studies by ancient civilizations.



BABYLONIAN ASTRONOMY

Dating back to 1800 BC, the Babylonians are said to be pioneers of the astronomical world. Being one of the first to develop a writing system, the Babylonians recorded, in detail, multiple astronomical observations. This civilisation proved to be the foundation of modern astronomy with its advanced discoveries.

Some of the notable discoveries by the Babylonians include the existence of the Zodiac, the 12-month Lunar calendar and the finding of five planets visible to the naked eye. In fact, some of the first observances of the renowned Halley's comet were also recorded by them. The Babylonian astronomers had progressed enough that in the next few generations, they could successfully predict the behaviour of the moon and the planets.

GREEK ASTRONOMY

Despite coming later into the picture, the Greeks were known to be the 'Fathers of Ancient Astronomy' due to the incredible discoveries during their period. Greek Astronomy, despite being a scientific domain, influenced cultural and academic ones too.

There is no doubt that Greek Astronomy constantly impacts the findings of modern world astronomy.

Applying their ground-breaking formulas from mathematics in astronomy, the Greeks were the first to accurately calculate the distance between the Earth and the Moon, as well as the circumference of the Earth. Ancient Greeks, upon observing the sky, had noticed two types of celestial bodies; the fixed stars and the wandering stars. Soon, the Greek astronomer Aristarchus of Samos suggested that the Earth and other planets revolved around the sun, which were previously labelled as wandering stars. Lastly, in the 5th BC, it was widely known that the Earth was spherical in shape due to the analysis by Greeks

EGYPTIAN ASTRONOMY

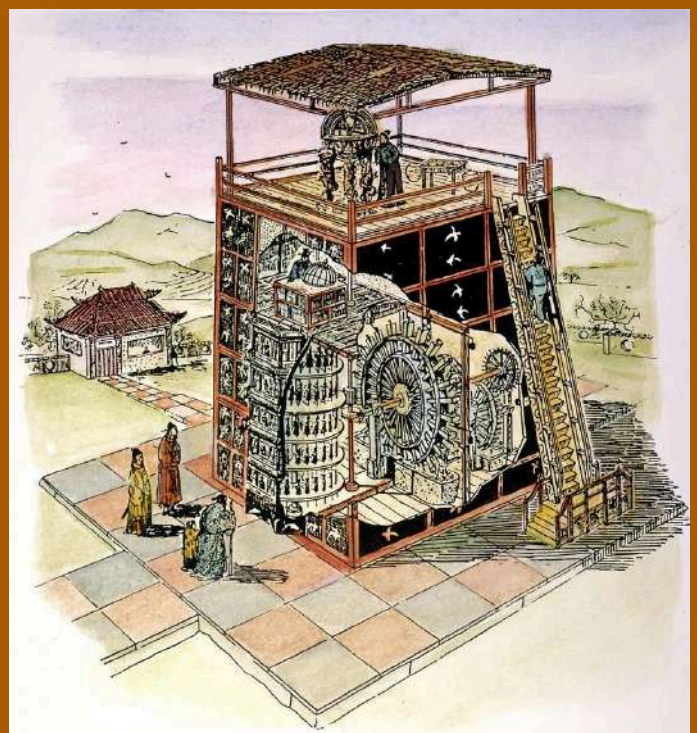
For the Egyptians, astronomy played a pivotal role in different parts of their lives especially in agriculture and trade. The Egyptians focused much on applying their theories practically. This included tracking time, predicting weather change, the pattern of the Nile floods and navigation. They created a calendar based on the star Sirius's phases by noting the stars' movement and positions. Egyptians even divided their year according to the Nile's flood system to produce better yield. Astronomy was one of the ways Egyptians had expanded their empire. Using the position of the stars, they trekked through seas and deserts to open up trade opportunities and later expand their land.

Furthermore, astronomical sites were constructed in several parts of the civilizations. An excellent example is the Nabta Playa, a circular stone construction that is thought to be a gigantic calendar used to determine the summer solstice.

CHINESE ASTRONOMY

Astronomy was a momentous discipline for the Chinese, valued in both their cultural and scientific history. It is widely known that Chinese astronomers had substantial records in the field, one of them being the documentation of comets and supernovae.

To measure time accurately, the Chinese had created apparatus namely the armillary sphere and the water clock. Similar to the Egyptians, this civilization also harvested crops and journeyed through the seas by examining the stars in the sky. In their time, they developed a unique astronomical system composed of the research on comets, stars and planets.



CONCLUSION

Besides these four, there are many discoveries by different ancient civilizations which take root in modern day astronomy. Hence, it is noteworthy to say that much of what makes up today's discoveries is not different from the past, though much more advanced. The effort by these civilisations makes things much easier for astronomers and public alike, by shaping their daily lives. Studies that took years of effort, now, go merely unheeded without any applause for their work.



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THE HISTORY OF VACCINATION:

FROM EDWARD JENNER TO MRNA

VACCINES

SNEHA

Vaccination has transformed public health, with what used to be killer diseases now being preventable. The history of vaccination, starting with the trailblazing efforts of Edward Jenner in the 18th century, has undergone a dramatic transformation over the centuries, leading to the production of mRNA vaccines that were at the center of the fight against the COVID-19 pandemic.

Modern vaccination was founded by English physician Edward Jenner in 1796. After observing that milkmaids who contracted cowpox did not contract smallpox, Jenner hypothesized that cowpox could be a protection against the deadlier disease.

He experimented by inoculating eight-year-boy James Phipps with a sample of a cowpox lesion and then exposing him to smallpox. The boy did not contract the disease, thus confirming Jenner's premise to be true and the birth of immunization science (Riedel, 2005). Jenner's smallpox vaccine opened the door for future vaccines and eventually led to the global eradication of smallpox in 1980, which was declared by the World Health Organization (WHO, 1980).

Following Jenner, the 19th and 20th centuries saw the introduction of numerous vaccines for diseases such as rabies, diphtheria, and tuberculosis.

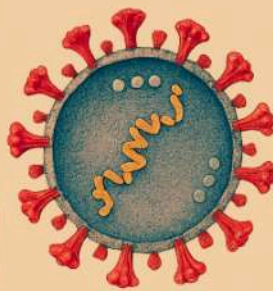
THE HISTORY OF VACCINATION



Edward Jenner



Smallpox



mRNA

French microbiologist Louis Pasteur was a key figure by developing the rabies and anthrax vaccines and pioneering the use of attenuated (weakened) pathogens as vaccines (Plotkin, 2014). These breakthroughs not only expanded the scope of vaccination but also highlighted the role of microbiology and immunology in the development of vaccines.

The 20th century was the era of introduction of inactivated and live-attenuated vaccines, of which polio vaccines also were introduced. Jonas Salk introduced the inactivated polio vaccine (IPV) in 1955, and Albert Sabin introduced the oral polio vaccine (OPV) in the early 1960s. Both these developments were a significant contribution toward polio control throughout the world (Offit, 2005). The era also witnessed the introduction of mass vaccination campaigns, enhanced public health infrastructure, and combination vaccines such as DTP (diphtheria, tetanus, and pertussis).

The 21st century witnessed a fresh generation of vaccine technology with genetic engineering and mRNA-based platforms. These platforms possessed the capability of rapid development and large-scale manufacture. The COVID-19 pandemic accelerated the implementation of mRNA vaccines. The Pfizer-BioNTech and Moderna mRNA COVID-19 vaccines, encoding the SARS-CoV-2 spike protein to elicit immunity, were granted emergency use approval in December 2020 (Polack et al., 2020; Baden et al., 2021). These were remarkably effective and a paradigm-shifting strategy for immunization.

In contrast to conventional vaccines that work using weakened or inactivated pathogens, mRNA vaccines employ synthetic messenger RNA that teaches cells to make an antigen to provoke an immune response. This platform is not only faster to develop but also flexible enough to accommodate new pathogens, with vaccines for diseases such as HIV, Zika, and even cancer in the future (Pardi et al., 2018). In brief, the history of vaccination is one of scientific advance and public health success. From Jenner's rudimentary cowpox inoculations to advanced mRNA vaccines, each advancement along the way has helped the world battle infectious diseases. As science continues to advance, vaccination is one of the greatest tools in modern medicine, holding out hope against both old and new enemies.

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THE EVOLUTION OF PROSTHETICS:

FROM ANCIENT WOODEN LIMBS TO BIONIC ENHANCEMENTS

SNEHA

Prosthetics, as man-made replacements for amputated body parts, have evolved significantly from their primitive origins. From crude wooden appendages used by ancient cultures to sophisticated bionic limbs that mimic natural motion, the evolution of prosthetics illustrates human resolve to regain mobility, dignity, and independence for limb-loss victims.

The first prosthetic we have any record of was in ancient Egypt circa 1500 BCE—a wooden toe found on a mummy, believed to have cosmetic as well as functional intent (Finch et al., 2000).

The Romans and Greeks also employed iron and bronze prosthetics, primarily for soldiers who had been ravaged by war. These were more symbolic than functional, meant to denote warrior status or social position as much as mobility.

In the Medieval and Renaissance periods, the development of prosthetic devices became increasingly sophisticated. Ambroise Paré, a 16th-century French barber-surgeon, is recognized for his notable contributions to this field.

He created mechanical limbs featuring locking joints, which enabled users to

attain a broader spectrum of motion (Paré, 1575). Although these devices were predominantly crafted from wood, leather, and metal, the innovations introduced by Paré established the basis for practical prosthetics that could assist individuals in their daily functions.

The Industrial Revolution of the 19th century brought tremendous changes. With advances in materials and manufacturing, prosthetics were made more durable and accessible.

The American Civil War and World War I spurred advances, as the number of amputees expanded exponentially. Civil War amputee J.E. Hanger founded the Hanger Orthopedic Group and enhanced prosthetic limbs with more ergonomic and lightweight designs (Hanger Clinic, n.d.).

The 20th century saw a technological revolution in prosthetics. Plastics, aluminum, and light alloys made the limbs more efficient and comfortable. During the latter part of the century, the innovation of myoelectric prosthetics enabled artificial limbs to be controlled by electrical impulses produced from the muscles of the user. This enhanced movements to be more precise and

natural, particularly in upper-limb prosthetics (Pylatiuk et al., 2007).

Today, the convergence of robotics, artificial intelligence, and neural engineering has brought prosthetics to a new era of bionic innovation. Modern prosthetic limbs, like DEKA Research's LUKE Arm, possess multiple degrees of freedom, pressure sensors, and the ability to grasp delicate objects with precision. Versions also offer sensory feedback, allowing users to perceive texture or heat through their prosthetic limbs (Ortiz-Catalan et al., 2020).

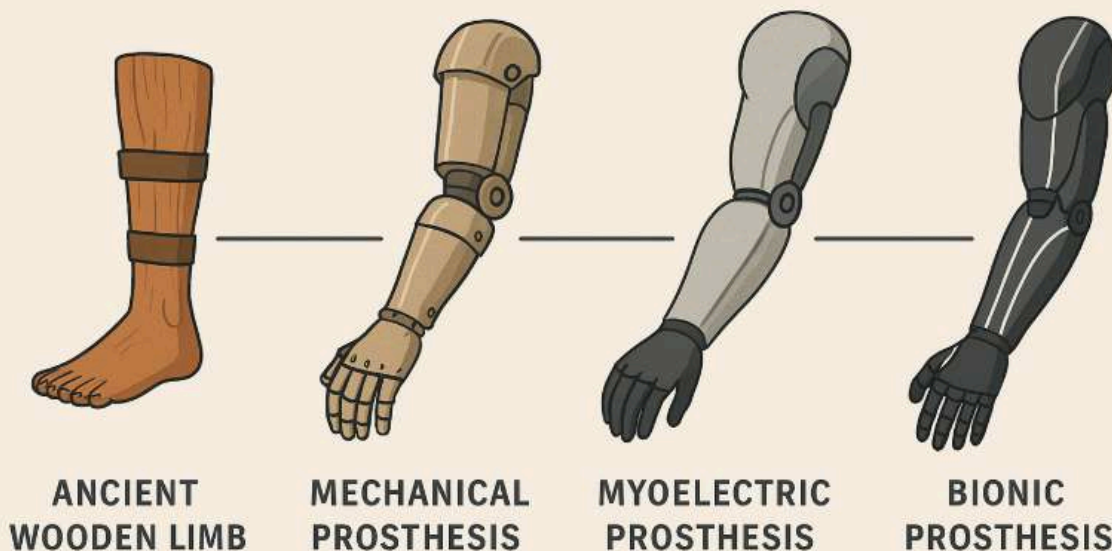
In addition, research in brain-computer interfaces (BCIs) has made it possible to directly control prosthetic limbs through neural signals. For instance, researchers at the University of Pittsburgh and the University of Utah have developed systems whereby implanted electrodes translate cerebral activity into a means by which a robotic arm can be moved with

the user's intention (Collinger et al., 2013).

The future of prosthetics is at the junction of biotechnology, machine learning, and regenerative medicine. Scientists are developing 3D-printed customized prosthetics, stem-cell-based limb regeneration, and the completely integrated cybernetic limb. These technologies do not only seek to restore the function lost but also to enhance human capabilities, making it difficult to distinguish between restoration and augmentation. In summary, the evolution of prosthetic devices—from early wooden toes to sophisticated bionic limbs—highlights both technological advancements and the enduring strength of the human spirit. Each breakthrough represents a forward step towards not only restoring physical form but also restoring the wholeness of the human experience.

THE EVOLUTION OF PROSTHETICS:

FROM ANCIENT WOODEN LIMBS TO BIONIC ENHANCEMENTS



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