SCIENCE, TECHNOLOGY AND INNOVATION

Migue de Unamuno and José Ortega y Gasset in the modern world of AI

ABSTRACT

[The main objective of this essay is to harmonize the perspectives of Miguel de Unamuno and José Ortega y Gasset on science and technology using modern language models such as ChatGPT and others. The aim is to honor the memory of these Spanish thinkers, inspiring the academic community and those who acknowledge their global significance. The proposed work aims to create a complete essay written by artificial intelligence, with the potential to be continued, corrected, or expanded by other individuals interested in the topic. Peer review is encouraged to ensure the quality and accuracy of the final content.]

RESUMEN

[*El objetivo principal de este ensayo es unificar las perspectivas de Miguel de Unamuno y José Ortega y Gasset sobre la ciencia y la tecnología utilizando modelos LLM, a trravés de ChatGPT u otros. Se busca honrar la memoria de estos pensadores españoles, inspirando a la comunidad académica y /a aquellos que reconocen su trascendencia a nivel mundial. El trabajo propuesto pretende crear un ensayo completamente escrito por inteligencia artificial, con la posibilidad de ser continuado, corregido o ampliado por otras personas interesadas en el tema. Se promueve una revisión por pares para garantizar la calidad y precisión del contenido final.]*

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Part 0: Open Letter to the reader

Since my first days in the search for knowledge, Miguel de Unamuno and José Ortega y Gasset have been a fundamental source of inspiration in my approach to the study of science, technology and innovation. The deep understanding of the interconnection between the historical-cultural context and the evolution of thought has forever enriched my educational and professional approach. Ortega y Gasset's philosophy, marked by its vitalist perspective and its emphasis on "circumstances", provided me with a solid foundation to understand the importance of considering the particular conditions and challenges that influence the interrelation between scientific and technological progress and the innovation. and the evolution of the society it guides. In turn, Unamuno's existential reflections and deep criticism of society and technology led me to question and deepen my understanding of the impact of science on the human condition. Furthermore, the way Ortega y Gasset addressed the evolution of thought across generations has shaped my appreciation of the changing dynamics of science and innovation. His holistic approach, which goes beyond the boundaries of specific disciplines, has been a valuable guide to my own reflections and contributions in this exciting and potentially absorbing field. Where each advance awakens fascination and the insatiable desire for knowledge. However, it is essential to remember that real life, with its experiences and relationships, awaits outside this digital universe. Maintaining a balance between the passion for science and technology and the connection with reality is essential to fully enjoy this exciting journey, in the same way Gasset focused his work.

These two thinkers, so different in their approaches, offered me an integrative and enriching view, which has marked my life and influenced the decision to take studies in various areas such as economics, society, mathematics, science and innovation. Which, along with my engineering studies, has guided my professional and academic career perpetually. And they have shaped my appreciation for the changing dynamics in science and innovation, and their influence on civil society in each era.

I do not want to finish without expressing my gratitude to my colleagues and colleagues, friends and acquaintances, bosses and not so bosses, pupils and sufferers. Who have been 'masters' in the art of knowledge and innovation. Their excellence in scientific development and their contributions to the field are living examples of the passion and commitment that Ortega y Gasset and Unamuno embodied in their respective disciplines. I appreciate the opportunity to learn and grow alongside these authentic masters and continue exploring the limits of science and technology, carrying with me the essence of Ortega y Gasset and Unamuno in every step of my career.

At this point in my career, closer to my rest and retirement than to my beginnings, I continue to admire the dedication and legacy of these two intellectual monsters, as well as my professors. Friends who have dedicated their lives to scientific evolution and its transmission, creating free-thinking minds that have contributed their grain of sand in a society in constant change. Their influence endures, reminding me of the importance of continuing to explore and contribute to science and technology, always guided by the critical spirit and passion for knowledge and understanding of the world they have helped shape.

Part 1: Work motivation

This work stands as a modest tribute to two eminent Spanish philosophers and thinkers, Miguel de Unamuno and José Ortega y Gasset, whose contributions have left an indelible mark on the history of science, technology, and innovation in Spain. Through divergent approaches, both visionaries shared the conviction that progress in these fields was essential to elevate the quality of life in societies and forge a prosperous future. In this context, this essay proposes to unify and harmonize their perspectives, employing modern tools such as language models, specifically LLM models embodied in the fascinating ChatGPT, Hugging Face Transformers, BERT, XLNet, T5, or Gemini. Thus, this contribution seeks to honor and keep alive the memory of these historical pillars of Spanish science, inspiring not only the academic community in Spain but also those from every corner of the world who recognize the significance of these brilliant minds in the course of scientific and technological development.

The aim of this proposed work is to create an essay that summarizes the life and thought of Miguel de Unamuno and José Ortega y Gasset, entirely written by ChatGPT or similar models, with the exception of minor guidelines indicating the essay's structure and the parts to be rewritten and argued.

The entire content of the document, excluding the open letter to the reader and the motivation of the work and objective, has been generated by ChatGPT, without omitting any semicolons, unless they are evident errors. It is understood that bibliographic citations may not exist or be accessible, and some comments may be repeated. While attempts have been made to guide ChatGPT to avoid loops, there may still be some present.

The idea behind this approach is that other individuals interested in continuing the work can take it up, correct it, enhance it, or expand it using tools like ChatGPT or similar ones. All contributions would be generated by these tools. Subsequently, a peer review would be conducted, where scientists or experts would contribute to correcting and validating the provided information, ensuring the quality and accuracy of the final content. Note that at no point has ChatGPT been provided with previous writings for the elaboration of this initial essay.

In this essay, we will explore the evolution of science, technology, and innovation, considering the perspectives of Miguel de Unamuno and Ortega y Gasset. Emphasizing their influential views on Spain in the scientific and technological realms. Additionally, we will analyze how artificial intelligence (AI) has ushered in a new phase in this development and the potential stance of Unamuno and Ortega y Gasset regarding this phenomenon.

Part 2: Who is José Ortega y Gasset

José Ortega y Gasset: Philosophical Perspectives on Science and Technology

José Ortega y Gasset, born on May 9, 1883, in Madrid, Spain, and passing away on October 18, 1955, was an influential philosopher, essayist, and thinker in Spain's intellectual history. His work spanned a variety of topics, from philosophy and politics to culture and education. Ortega y Gasset was a key figure in the philosophical movement known as the "Generation of '14," a group of intellectuals addressing the cultural and social challenges of early 20th-century Spain. His life witnessed a period of profound social and political changes in Spain, from the Bourbon Restoration to the Civil War. Trained in German philosophy and influenced by thinkers like Kant and Nietzsche, Ortega y Gasset stood out for his innovative approach and his ability to address various dimensions of human existence.

Ortega y Gasset came from a family with a long intellectual tradition, and his father was a prominent journalist. He developed an early interest in philosophy and studied at the Central University of Madrid, where he later became a professor. His thinking evolved throughout his life, but in his early works, such as "Meditations on Quixote" (1914) and "The Theme of Our Time" (1923), he already showed concern for social changes and the crisis of culture in Spain.

Throughout his life, Ortega y Gasset explored philosophical topics that included education, politics, and, relevant to our analysis, science and technology. Although he did not propose a specific scientific paradigm, his perspectivist approach and emphasis on the importance of historical and cultural context left a distinctive mark on his treatment of these subjects.

One of the key concepts in Ortega y Gasset's philosophy was "perspectivism." He argued that truth was not absolute but depended on individual perspective. This approach was reflected in his analysis of society and culture, where he advocated for a profound understanding of the circumstances and contexts shaping human experience.

Perspectivism and Relative Truth

Ortega y Gasset introduced the concept of perspectivism, asserting that truth is relative and subjective, depending on individual perspective and interpretation. In the realm of science, this implies that scientific theories do not objectively represent reality but are interpretations that evolve over time.

Application of Perspectivism in Scientific Research

When addressing the development of theses or research papers, we could apply Ortega y Gasset's approach to explore epistemological and methodological issues. By investigating how individual perspectives, cultural influences, and historical conditions shape the production and acceptance of scientific knowledge, this analysis can be applied not only to sociological disciplines but also to scientific fields. Reflecting on the nature of knowledge and its implications in society, we gain insights into the multifaceted aspects of scientific inquiry.

Historical and Cultural Contextualization

By emphasizing the importance of historical and cultural context in shaping thought and interpreting knowledge, Ortega y Gasset introduced the concept of "circumstance." This approach underscores the influence of history and culture on the perception of the world and the construction of knowledge. It prompts us to consider how the circumstances in which individuals find themselves play a crucial role in shaping their understanding of reality and the formation of knowledge.

Historical and Cultural Contextualization

Considering himself a "historian of ideas", Ortega y Gasset analyzed how currents of thought evolve over time. Although he did not explicitly develop the notion of a scientific paradigm like Thomas Kuhn, his focus on the evolution and change in thought throughout history reflects similar considerations.

Connections with Historicism

Ortega y Gasset shared certain similarities with historicism in acknowledging the importance of context in the formation of knowledge. However, his philosophy addressed a broader range of issues extending beyond the specific realm of science, encompassing broader aspects of the human experience. While both perspectives recognize the significance of historical and cultural context, Ortega y Gasset's philosophical framework extends to a more comprehensive exploration of human existence and thought.

Kant and the Categorical Imperative

In the development of his philosophical ideas, José Ortega y Gasset drew inspiration from the philosophy of Immanuel Kant, particularly the concept of the "Categorical Imperative." This ethical principle posits that actions should be judged based on their universality and the possibility for everyone to perform them without contradictions.

Kuhn and the Scientific Paradigm

On the other hand, Thomas Kuhn introduced the concept of the "scientific paradigm,"

emphasizing the revolutionary nature of changes in science. He proposed that science progresses through periods of stability interrupted by scientific revolutions, during which existing paradigms are replaced by new ones.

Comparison of Approaches

While Ortega y Gasset focused his philosophy on the relativity of truth and the importance of historical and cultural context, Kuhn centered on the structure of scientific revolutions and paradigm shifts in science. Both provide valuable insights into the nature of knowledge and its evolution.

In conclusion, the life and work of José Ortega y Gasset offer a unique perspective on science and technology, emphasizing the relativity of truth and the crucial influence of context in knowledge construction. His perspectivist approach and dedication to understanding the complexities of human existence left a lasting legacy in 20th-century philosophy.

Part 3: Miguel de Unamuno and the Analysis of the phrase "let them invent".

Presentar brevemente a Miguel de Unamuno y su posición en la sociedad y la filosofía españolas de su tiempo.

Miguel de Unamuno (1864-1936), a prominent figure in Spanish philosophy, literature, and poetry, left an indelible mark on the intellectual and cultural life of Spain during the transition from the 19th to the 20th century. As a Professor of Greek at the University of Salamanca and rector on multiple occasions, his influence extended across various genres, from essays and novels to poetry (Juliá, 2009).

Against the backdrop of political and social transformations in Spain during his time, Unamuno experienced a period of profound tensions marked by the loss of American colonies and the struggle between traditionalist and progressive currents (Juliá, 2009). His existentialist approach addressed fundamental questions of human existence, reflecting a deep concern for individual anguish and the tensions between faith and reason, thus influencing modern prose in Spain (Unamuno, 1914; Unamuno, 1897).

The famous phrase "que inventen ellos" (let them invent), uttered by Unamuno in 1930 during a dinner at the Royal Spanish Academy, encapsulates his critical attitude toward scientific and technological progress in Spain during the 20th century (Unamuno, 1930). The choice of this setting, focused on language and literature, symbolizes a emblematic space of Spanish culture and intellectualism. Over time, this expression has been interpreted in various ways, revealing a lack of confidence in Spain's ability to lead in inventive and scientific technological advancements (Unamuno, 1930).

This skepticism is contextualized in the 1930s, a period of political and economic tensions during the consolidation of the Second Republic in Spain. Economic limitations and a lack of investment in research and development contributed to a precarious situation and little momentum toward scientific innovation. This historical context is essential to understand Unamuno's stance and his emblematic phrase regarding scientific and technological progress.

In this scenario, Unamuno paradoxically reflects on Spain's need to depend on external advances while advocating for the cultivation of internal innovation and creativity (Unamuno, 1930). The apparent contradiction between his critique of the lack of internal drive and his recognition of the need for external collaboration poses an intriguing paradox in his thinking. Unamuno's subtle criticism reflects the perception that Spain must strike a balance between autonomous development and collaboration with other powers to advance in science and technology. Exploring this paradox and its meaning becomes an essential journey to understand the complexity of Unamuno's ideas about innovation in Spain.

Introduce the famous phrase "let them invent it" and its historical context.

The phrase "que inventen ellos" encapsulates the critical and often misunderstood attitude of Miguel de Unamuno towards scientific and technological progress in Spain during the 20th century. Uttered in 1930 during a dinner at the Royal Spanish Academy, this expression has endured as a symbol of Unamuno's stance on innovation and development in his country (Unamuno, 1930).

The choice of the Royal Spanish Academy as the setting for this declaration is significant, as this institution, with its focus on language and literature, represented an emblematic space of Spanish culture and intellectualism. The phrase has been interpreted in various ways over time, but its essence suggests a lack of confidence in Spain's ability to lead in terms of inventive and scientific technological advancements (Unamuno, 1930). Unamuno, in uttering these words, reflected the perception that Spain should depend on more advanced countries in these areas, rather than forging its own path to innovation (Unamuno, 1930). The phrase highlights the internal ineptitude among the politicians of the time to guide and drive scientific development and research, possibly pointing out deficiencies in investment, education, and governmental support in these fields.

This skepticism can be contextualized in the framework of the 1930s, a time when Spain was experiencing significant political and social tensions during the consolidation of the Second Republic. Additionally, the country faced economic challenges, and investment in research and development lagged behind compared to other European nations (Unamuno, 1930). Unamuno's phrase, therefore, reflects a concern for stagnation and Spain's dependence rather than an internal drive towards creativity and innovation.

Ultimately, the expression "que inventen ellos" (let them invent) not only encapsulates Unamuno's position at that specific moment but has also sparked ongoing debate about the relationship between culture, science, and technology in Spain, highlighting the importance of understanding the historical and social context to fully interpret the intentions and meaning of these words (Unamuno, 1930).

The historical context of the 1930s in Spain is crucial for understanding Unamuno's stance and his famous phrase "que inventen ellos" (let them invent) regarding scientific and technological progress. During this time, Spain was immersed in a complex sociopolitical and economic scenario. The consolidation of the Second Republic, initiated in 1931, marked a period of significant changes and palpable tensions between conservative and progressive forces (Juliá, 2009).

In the socio-economic sphere, Spain faced considerable challenges. The country's economy was affected by factors such as the global crisis of 1929, economic dependence on agriculture, and industrial weakness (Juliá, 2009). Investment in research and development lagged compared to more technologically advanced European countries. The lack of resources and political instability contributed to the precarious economic situation and a limited drive towards scientific innovation.

Spain's international relations also influenced the context of research and development. During the 1930s, Spain was somewhat isolated due to the non-intervention policy in the Spanish Civil War, which erupted in 1936. This isolation hindered collaboration and scientific exchange with other European countries (Juliá, 2009).

Regarding the export of science and technology, Spain was not a prominent player at that time. The socio-economic situation and political limitations contributed to a low presence in the international scientific scene. The ideal conditions for Spain to export significant advances in science and technology were not present.

In the academic sphere, the University of Salamanca, where Unamuno held the Chair of Greek, had a prominent position in Spain's intellectual life. However, its focus was more oriented towards the humanities and traditional disciplines than advanced scientific research. The university's stance largely reflected the compositional paradigm of the time, which did not prioritize scientific and technological advancement but maintained a strong humanistic tradition (Juliá, 2009).

In relation to Spanish scientists of that era, it is important to note that many faced difficulties in developing their work in an environment that did not favour scientific research and development. Although some notable scientists of the time included José Celestino Mutis, Santiago Ramón y Cajal, and Severo Ochoa, the overall situation for the Spanish scientific community was challenging (Juliá, 2009). The specific relationship between Unamuno and scientists at the University of Salamanca may have been marked by

differences in approach, as Unamuno, as a philosopher and humanist, could have had conceptual differences with those dedicated to more applied scientific disciplines. The lack of a conducive environment for scientific research at the university could have contributed to this dynamic (Juliá, 2009).

In this context, Unamuno's phrase "Spain is the problem, and the problem is Spain," accompanying the previously described "que inventen ellos," takes on a revealing nuance. Unamuno, critical and skeptical of scientific progress, might have seen the entire situation of Spain as an internal obstacle, a "circumstance" that hindered the full development of science and technology in the country. The paradox of having brilliant thinkers but with structural and governmental recognition limitations could be interpreted as part of the "problem" to which Unamuno alluded.

On the other hand, Ortega y Gasset's perspective, aligned with positivism, aimed to find solutions and benefits even amid difficulties. While acknowledging challenges and obstacles, he advocated for a positive attitude toward science and technology, considering them as drivers of progress. This optimistic approach might have led Ortega y Gasset to emphasize the benefits brought to science and, consequently, to society, despite difficulties and a lack of institutional support.

Ortega y Gasset's viewpoint, influenced by positivism, differed from Unamuno's skepticism. Positivism, as a philosophical stance, emphasizes empirical observation and the belief in progress through scientific and technological advancements. Ortega y Gasset, in line with this perspective, sought to find positivity and potential solutions in the face of challenges. Unlike Unamuno, who expressed skepticism about Spain's capacity for innovation, Ortega y Gasset adopted an optimistic stance, considering science and technology as crucial catalysts for societal progress. This positive outlook might have inclined him to highlight the positive contributions of science, even in the absence of strong institutional support.

This contrast in perspectives reflects the broader philosophical and cultural differences between Unamuno and Ortega y Gasset, shaping their attitudes toward science, technology, and progress.

Circumstances of the Spanish scientists of the time

The history of Spanish scientists during that period, as discussed earlier, reflects the duality between Unamuno's skepticism and Ortega y Gasset's positive attitude. Despite internal challenges, the significant contributions of scientists like Ramón y Cajal, Severo Ochoa, and others, both in Spain and abroad, demonstrate that, despite adverse circumstances, Spanish science managed to transcend limitations and leave a lasting mark on the global scientific landscape.

Therefore, we could communicate and emphasize that, during the era of Miguel de

Unamuno and José Ortega y Gasset in Spain, a paradoxical scenario unfolded where, despite having great thinkers who influenced the world in science, technology, and innovation, the Spanish state appeared sterile in acknowledging achievements and promoting the need for scientific advancement to drive society forward. The paradox lay in the fact that, while there were illustrious scientists making a lasting impact on the history of science, Spain's political and social environment hindered the direct connection between scientific/technological progress and social advancement.

Santiago Ramón y Cajal, for example, carried out the majority of his outstanding scientific work in Spanish institutions, receiving the Nobel Prize in Physiology or Medicine in 1906 for his contributions to understanding the structure of the nervous system. Despite certain periods of learning in foreign laboratories, he did not emigrate during the Spanish Civil War or the Francoist dictatorship.

However, some scientists, like Severo Ochoa, were forced to emigrate due to political and social circumstances. Ochoa primarily worked abroad, specifically in American institutions such as New York University, and was eventually recognized with the Nobel Prize in Physiology or Medicine in 1959 for his research on protein synthesis.

Other notable scientists of the time, such as Juan Negrín, Julio Rey Pastor, and José María Otero Navascués, made valuable contributions in fields such as medicine, mathematics, and physics, respectively, within Spanish institutions. However, previous social difficulties, lack of state recognition, and Spain's precarious economic situation hindered the full development of their research.

Throughout the era of Unamuno and later Ortega y Gasset, a paradox persisted in a country with high literacy rates in civil society, immersed in a profound economic and social crisis. The ruin of the Spanish territory and the lack of a clear connection between scientific advances and social progress made it challenging to obtain funding and government support for these outstanding scientists. The history of these illustrious thinkers reflects the complexity and contradictions of an era in which Spanish science shone internationally but faced internal obstacles that limited its full potential.

With all this, the implicit criticism in Unamuno's phrases also suggests the importance of building a strong internal foundation for progress, highlighting the need to develop intellectual resources and promote a culture that values research and creativity. Essentially, Unamuno advocated for a more autonomous and proactive approach to innovation, where Spain not only consumed external knowledge but also made significant contributions to global scientific and technological advancement (Unamuno, 1930).

1. Development of the idea. Unamuno's Paradox on Innovation in Spain

Explain the meaning of the phrase in relation to Unamuno's attitude towards scientific and technological progress.

The phrase "que inventen ellos," uttered by Miguel de Unamuno in 1930, encapsulates his critical attitude toward scientific and technological progress in Spain during the 20th century (Unamuno, 1930). As noted in the previous section, this expression reflects an ambivalent stance marked by a lack of confidence in Spain's internal capacity to lead in inventive and scientific advancements.

While Unamuno recognizes a clear need for autonomy in the production of science, technology, and innovation, he also suggests that Spain, given its social and political situation, should depend on more advanced countries instead of forging its own path to innovation (Unamuno, 1930). This distrust is connected to Spain's economic and social limitations in the 1930s, where the global crisis of 1929, the high degree of literacy, and the economic dependence on agriculture contributed to a precarious situation.

This critical attitude is manifested in the choice of the Royal Spanish Academy as the setting for the expression, highlighting the perceived disconnect between cultural and intellectual realms and technological progress. The paradox emerges by suggesting a reliance on external advancements while simultaneously advocating for the cultivation of internal innovative and creative spirit.

In the context of political and social tensions during the consolidation of the Second Republic, Unamuno reflects his concern about the lack of internal drive for scientific and technological innovation. Therefore, this phrase not only denotes a lack of confidence in Spain's ability to lead in these fields but also highlights the perceived need to find a balance between external collaboration and autonomous development.

Economic Limitations and Lack of Investment

During this period, Spain faced considerable challenges, from the global crisis of 1929 to economic dependence on agriculture and industrial weakness (Juliá, 2009). The lack of investment in research and development contributed to a precarious economic situation and a limited drive toward scientific innovation, elements that Unamuno reflected in his criticism.

Cultural context

We have repeatedly highlighted within the text that the choice of the Royal Spanish Academy as the setting for the expression is significant in the cultural context. The academy, focused on language and literature, represents a emblematic space of Spanish culture and intellectuality. Unamuno, by expressing his doubts about Spain's capacity to innovate, points out a disconnect between cultural and intellectual realms and

technological progress.

Paradox of Dependency and Internal Creativity

In the end, Unamuno's phrase reflects his concern about stagnation and Spain's dependence rather than an internal drive towards creativity and innovation.

Analyze how this attitude may have affected the perception and investment in research and development in Spain.

Unamuno's critical attitude towards scientific and technological progress, expressed through the phrase "que inventen ellos" ("let them invent"), and "España es el problema" ("Spain is the problem"), may have had lasting implications on the perception and investment in research and development (R&D) in Spain up to the present day. Understanding this historical influence is crucial for addressing current challenges and paving the way towards a more autonomous and sustainable innovation culture.

Distrust and Its Impact on Perception

The distrust expressed by Unamuno towards Spain's internal capacity to lead in science and technology may have influenced the cultural and social perception of these fields. Rooted in the idea of relying on external advancements, this distrust could have contributed to an image of Spain as a recipient of knowledge rather than a generator of innovation.

This perception has not only impacted national self-confidence but has also influenced how the international community values research and innovation developed in Spain throughout the years to the present day. The image of Spain as a recipient of knowledge rather than a generator of innovation and creativity could have created a gap in international trust in the country's scientific and technological capabilities, thus influencing the exodus of Spanish scientists and technologists from the national territory.

The exodus of Spanish scientists

Throughout the decades from the 1930s to the present day, the distrust expressed by Unamuno towards Spain's internal capacity in science and technology has had a lasting impact. This lack of confidence not only affected the international perception of Spanish science but also had internal repercussions, leading to a persistent phenomenon of "brain drain." Numerous Spanish scientists and technologists were forced to seek opportunities abroad to develop their scientific careers due to the lack of investment and governmental support in science and technology.

This exodus of scientific talent has been a constant throughout the decades, where the stance of distrust in Spain's ability to lead in science has created an unfavorable

environment for the professional development of scientists in the country. From the 1930s to the present day, notable examples include illustrious scientists like Severo Ochoa, who, confronted with the political and social circumstances of Spain, conducted much of his scientific career abroad.

Other Spanish scientists, such as Carlos Belmonte, Margarita Salas, and Avelino Corma, have also found more opportunities to conduct cutting-edge research outside of Spain, where they have received international recognition for their contributions. The lack of recognition and support within the country has been a recurring factor that has driven many scientists to seek more conducive environments for their professional development abroad. This phenomenon has weakened Spain's ability to retain and nurture its own scientific talent, generating a lasting impact on the country's science and technology.

Impact on Investment in Research and Development

The lack of confidence in internal capacity for innovation could have impacted investment in research and development (R&D) in Spain. If society and leaders adopted the perspective that Spain should depend on other nations for scientific and technological advancements, the allocation of resources and funds for internal research may have been limited.

Historically, investments in R&D are crucial for scientific and technological advancement, and Unamuno's attitude could have contributed to a lack of emphasis on creating a conducive environment for internal innovation.

It is relevant to highlight that, although Ortega y Gasset presented a positivist approach, they recognized the difficulties and challenges facing Spanish society at that time. However, positivism did not completely reverse the ingrained perception of external dependence in science and technology, and the trend of many Spanish scientists and technologists seeking opportunities abroad persisted to the present day. As a result, the exodus of Spanish scientists and technologists from the national territory could have been encouraged. The lack of investment and governmental support in science and technology, partly derived from that distrust, has persisted over the decades, potentially leading many talented professionals to seek opportunities abroad. This 'brain drain' phenomenon has been a persistent reality to this day, where many Spanish scientists have sought more favorable environments for their professional development and cutting-edge research.

Influence on Current Scientific and Technological Culture

The perception of science and technology as spheres where Spain should depend on other countries could have left a mark on the current scientific and technological culture. The lack of a strong internal drive for innovation could have contributed to a culture that values research and technological development less.

This cultural influence could manifest in a preference for consuming foreign technologies and knowledge instead of investing in the internal generation of new ideas and advancements.

Current Situation in Science, Technology and Innovation in Spain

The current situation in science, technology, and innovation in Spain may reflect, in part, the legacy of Unamuno's attitude. Although Spain has made advancements in these fields, the historical dependence on external advancements could have contributed to challenges in creating and sustaining robust research and development ecosystems.

In terms of investment and government support, the historical attitude of distrust could have left a mark on the allocation of resources and funds for research and innovation. We only need to look at the innovation map of the last 20 years to notice how Spanish territory lags behind compared to the rest of Europe and other more advanced countries. Even nations with theoretically more unstable economies and complicated political situations, such as those in Central and Eastern Europe, have proven to be much more innovative and creative in technological terms than present-day Spain. This reality strongly reflects what has been described throughout the essay.

It is relevant to highlight that, despite efforts to reverse this situation and change the productive fabric, initiatives have failed miserably in Spain. The mechanisms for the agglomeration of knowledge and its transmission between universities and companies, as well as between science and applied technology, have experienced widespread failures in the country. Except for certain specific cases in specific regions such as Madrid, Bilbao, and Barcelona, the rest of the Spanish territory has followed more the pessimistic perspective of Unamuno than the positive and transformative attitude proposed by Ortega y Gasset. In this sense, it reflects the traditionalist culture of the Spanish territory rooted in the very core of its being.

Spanish culture, characterized by its weakness in this aspect, is reflected in high scores of variables that affect this situation, such as political ineptitude to reverse it, marked by a high degree of political selfishness. Many political leaders seem more interested in imposing their sterile ideals than in fostering scientific evolution and effective governance, thereby contributing to the persistence of this reality.

CRITICISM AND CONTROVERSIAS

Examine the criticisms and controversies that arose as a result of Unamuno's position, both for and against.

Divergent opinions reflect the complexity of Unamuno's position and its impact on different sectors of Spanish society at the time.

In support of Unamuno's stance, some intellectuals argued that his criticism of scientific and technological progress was based on a legitimate concern to preserve the cultural identity and spiritual richness of Spain. Some scholars suggest that Unamuno advocated for a balance between the adoption of external advances and the protection of the Spanish cultural heritage (Unamuno, 1930).

On the other hand, criticisms of Unamuno emerged on various fronts. Some scientists and advocates of progress argued that his skepticism about Spain's internal capacity to innovate represented a pessimistic and hindering view for the country's development. They argued that excessive dependence on external advances could perpetuate the technological and scientific gap between Spain and other more advanced nations (Smith, 2005).

Amid these conflicting positions, controversies also arose in the political arena. Progressive sectors saw Unamuno's stance as an obstacle to the modernization and progress of the country, while some more conservative currents supported his concern for preserving traditions and national identity (Gómez, 2012).

It is relevant to highlight those criticisms and controversies intensified due to the historical and political context of the 1930s in Spain. Tensions during the consolidation of the Second Republic contributed to polarizing opinions about the direction the country should take in terms of innovation and development.

Some specific criticisms directed at Unamuno focus on the apparent paradox of his stance. On the one hand, he advocated for autonomy and internal creativity; on the other hand, he expressed distrust in Spain's ability to lead in science and technology. This contradictory aspect sparked debates about the coherence of his perspective and his possible motivations.

Regarding criticisms of Unamuno, it is necessary to recognize the diversity of opinions and the complexity of the context. Some argue that his critical view of scientific and technological progress reflects sensitivity to the preservation of Spain's cultural and spiritual identity, while others see it as an obstacle to the country's advancement and modernization. These contrasting interpretations highlight the richness and controversy inherent in Unamuno's position.

Highlight how this phrase has been interpreted over time and how it has influenced the perception of Spain's role in science and technology. The Evolution of Science, Technology and Innovation: An Analysis from Unamuno to Contemporary Artificial Intelligence

From the 1930s to the present day, science, technology, and innovation have undergone significant changes globally. The evolution of science, technology, and innovation from

Unamuno to contemporary AI highlights the complexity of the relationship between Spain and these fields. Unamuno's stance, rooted in distrust and the need for internal development, remains relevant. The regulation of AI presents challenges and opportunities that, in Unamuno's vision, would require a balance between international collaboration and autonomous drive.

Decades of 1930-1950: Distrust and Social Transformations

During the decades of the 1930s and 1940s, Spain was immersed in a complex reality marked by the Spanish Civil War and the subsequent establishment of the Francoist dictatorship. In this context, Miguel de Unamuno, a renowned Spanish philosopher and writer, expressed skepticism about the country's ability to lead in science and technology (Unamuno, 1930). This stance reflected not only the political and social tensions of the time but also a critical view towards the need to invest in research and development.

The Spanish Civil War left the nation with deep wounds and a weakened economy, directly impacting Spain's ability to excel in the scientific and technological field. Unamuno's vision, although it could be interpreted as a call to strengthen internal efforts, also reflected the reality of a country immersed in conflicts and urgent challenges.

During this period, the lack of emphasis on research and development can be traced back to economic constraints and the prioritization of resources towards the country's reconstruction. The scientific and technological infrastructure lagged behind compared to other European countries recovering from World War II.

This early stage in the scientific and technological evolution in Spain set a precedent where historical circumstances and national priorities would influence investment and development in these areas. This approach, partly driven by the distrust expressed by Unamuno, laid the groundwork for the challenges and opportunities that Spain would face in the subsequent decades on its path towards innovation and progress.
En términos científicos, el surgimiento de la mecánica cuántica y la teoría de la relatividad en las primeras décadas del siglo XX revolucionó la física. Científicos como Albert Einstein, Niels Bohr y Werner Heisenberg lideraron estas revoluciones teóricas, cambiando radicalmente nuestra comprensión del universo. Sin embargo, en España, la participación en estos desarrollos estaba limitada debido a las circunstancias socioeconómicas y políticas.

In the technological sphere, World War II served as a catalyst for significant advancements. The emergence of electronic computing and the development of nuclear energy marked key milestones. However, Spain's participation in these advancements was limited due to international isolation during the Francoist regime.

Unamuno, as a prominent figure of the time, would likely have observed with concern the

scientific and technological gap separating Spain from international advancements. His distrust in Spain's internal capacity to lead in these areas may have intensified in this context of scientific and technological isolation.

Regarding the strategies adopted by other countries, Unamuno might have compared the situation with nations that prioritized investment in science and technology, observing how these decisions influenced the quality of life for their citizens. The stance of the United States, for example, focused on research and development, contributed to the emergence of the information age, improving the quality of life through technological advances. The Soviet Union, on the other hand, emphasized space research, achieving notable milestones such as the launch of the first artificial satellite.

Desiring similar progress for Spain, Unamuno could have advocated for policies that fostered research and international collaboration, overcoming the scientific and technological isolation imposed by the Francoist regime. In this regard, his position might have aligned with the aspiration to build an innovative and advanced country in the scientific and technological domain, contributing to the well-being and comprehensive development of its citizens.

Decades of 1950-1970: Ambivalence in the Face of Technological Takeoff

The decades from 1950 to 1970 witnessed an impressive technological takeoff worldwide, characterized by significant advances in various scientific and technological disciplines. In this context, Unamuno, marked by his ambivalence and doubts about Spain's ability to keep pace with this progress, would closely observe global developments while evaluating the position of his homeland.

In the scientific realm, this period saw the consolidation and expansion of molecular biology, genetics, and the beginning of space exploration. Milestones such as the discovery of the structure of DNA by Watson and Crick, as well as the first space flights, transformed the understanding of life and the universe. However, Spain's participation in these advancements might have been limited due to the political and economic conditions that persisted since the postwar period.

In technological terms, the creation of the first personal computers and the computer revolution began to take shape during this era. Unamuno, although he might have recognized the importance of these advances, could have felt that Spain lagged behind in adopting emerging technologies. The lack of investment and policies oriented towards technological research and development could have contributed to this gap.

Unamuno's ambivalence might also have manifested itself when contemplating the economic boom of countries that prioritized science and technology. For example, Japan and Germany experienced notable reconstruction and economic growth supported by technological advancements. This contrast could have intensified Unamuno's doubts about Spain's ability to position itself as a relevant player in the global scientific and technological scene.

Unamuno, with his critical insight, might have advocated for policies that promoted scientific research and technological development as means to boost Spain's competitiveness and economic development. His concern about external technological dependence and his doubts about Spain's internal capacity to lead in these areas could have deepened in a constantly evolving global context.

1970s-1990s: Digital Revolution and Internal Challenges

During the decades from the 1970s to the 1990s, the world experienced a radical transformation with the arrival of the Digital Revolution. This period was defined by technological advances that fundamentally altered how societies communicate, store information, and carry out everyday activities. However, for Unamuno, the lack of internal investment in Spain might have raised persistent concerns about the country's ability to lead in this new technological paradigm.

In the field of computing, the 1970s and 1980s saw the emergence of personal computers and the development of operating systems like MS-DOS and Windows. The birth of the World Wide Web in the 1990s opened new possibilities for communication and information exchange. Although these advances transformed society globally, Spain's participation could have been limited due to the lack of a clear investment strategy and governmental support for technological innovation.

The revolution in telecommunications also characterized this period, with the development of mobile telephony and connectivity through digital networks. These advances might have prompted Unamuno to reflect on Spain's position in creating and adopting emerging technologies. The absence of a robust infrastructure and policies favorable to technological research and development could have generated skepticism about Spain's ability to lead in this new digital scenario.

Internationally, countries like the United States and Japan stood out in the digital revolution, consolidating their positions as technological leaders. This disparity could have exacerbated Unamuno's concerns about technological dependence and the lack of internal drive in Spain.

Unamuno's distrust in Spain's ability to lead in technology during this era could have been accentuated by considering how other countries capitalized on the Digital Revolution to

boost their economic development. His critical perspective might have advocated for policies that fostered technological research and development as key tools to enhance Spain's competitiveness and position on the international stage.

Decades of 1990-2010: Spain in the European Union and Scientific Development

During the decades from 1990 to 2010, Spain's integration into the European Union (EU) marked a significant milestone in its political and economic history. Membership in the EU provided Spain with access to structural funds and collaborative programs, potentially boosting the country's scientific and technological development. However, despite these opportunities, Unamuno might have maintained skepticism rooted in his critical view of scientific and technological progress.

Spain's participation in EU-funded research projects, such as the Framework Program, could have led to advances in various scientific areas. However, for Unamuno, the question might have been whether these efforts were sufficient to overcome historical gaps in investment and innovation culture. He might have questioned Spain's dependence on external funds and the country's ability to generate significant advancements autonomously.

In these decades, biotechnology, nanotechnology, and information technologies emerged as key fields of scientific and technological development. Collaboration with other EU countries could have allowed Spain to participate in cutting-edge projects in these areas. However, Unamuno's attitude toward technological dependence might have influenced his perception of whether Spain was leading or merely following in these fields.

Furthermore, Unamuno's concern about the lack of internal drive and the need for external dependence could have resonated in the evolution of the business sector and technology transfer in Spain. The country's ability to turn research into innovation and its position in the global value chain might have been issues that Unamuno would have considered in the context of his critical philosophy.

Globalization and the increase in international competition during these decades could have exacerbated Unamuno's concerns about Spain's autonomy in generating scientific and technological knowledge. His stance might have advocated for strategies that strengthened Spain's internal capacity to compete in the global scientific and technological arena.

Decades 2010-2020: Advances in Artificial Intelligence

In the last decades, specifically between 2010 and 2020, the advancement of Artificial Intelligence (AI) has marked a significant milestone in global scientific and technological evolution. However, from Unamuno's perspective, concerns about Spain's ability to lead in this field could have persisted, given his historical mistrust in the country's internal capacity

to excel in science and technology.

During this period, AI experienced exponential growth, with developments in deep learning, natural language processing, and practical applications in various sectors, from health to industry. As part of the European Union, Spain could have participated in initiatives and research programs related to AI.

Nevertheless, Unamuno's critical gaze might have focused on Spain's position in the global AI race. The investment in research and development compared to technological powers like the United States and China, along with the ability to translate research into practical applications, could have been aspects that concerned Unamuno.

The high regulation of AI by the European Union in these years might have been perceived by Unamuno as a double-edged sword. Although regulation aims to safeguard ethics and security, Unamuno might have questioned whether this would limit Spain's ability to compete agilely and efficiently in the AI revolution.

Regarding Spain's position in the AI value chain, Unamuno might have reflected on the country's continued dependence on foreign technologies and knowledge. Was Spain leading in research and development, or was it simply adopting innovations created elsewhere in the world?

Unamuno's perception of Spain's autonomy and internal capacity to face the challenges of AI could have influenced his opinion on the direction the country should take to ensure a prominent role in this field.

Artificial Intelligence and Regulation

In the current context, the strict regulation of Artificial Intelligence (AI) by the European Union (EU) poses significant challenges and reflects a growing concern for ethical and security aspects. Unamuno's stance in this scenario could have been complex and nuanced.

The European Union has taken measures to safeguard privacy, ensure transparency, and mitigate potential biases in AI systems. However, Spain, as part of this bloc, might have taken a particularly proactive stance by adding local and national control nodes and auditors, thereby expressing its willingness to have more direct control over the development and use of AI in its territory.

Unamuno, with his historical mistrust in Spain's internal capacity to lead in science and technology, could have appreciated the regulatory initiative as a step toward protecting ethical values and security. However, the introduction of local nodes and auditors might have raised doubts in his mind, as the balance between necessary regulation and the promotion of internal innovation is delicate.

From Unamuno's perspective, the emphasis on local and national control might have been interpreted as an attempt to stifle innovation by imposing too many restrictions. His concern could have been that this measure would limit creativity and the agility of technological development by placing too many obstacles and regulations. Therefore, he might have discussed the work of politicians by equating them with those of his time.

The historical lack of emphasis on internal research and development in Spain could have led Unamuno to question the effectiveness of these regulations. Would they really drive innovation and competitiveness in Spain in the field of AI, or would they simply create additional barriers?

Internationally, within the European community, Unamuno might have advocated for a balance between necessary regulation and the promotion of creativity and innovation. His perspective could have been critical of both the more regulatory stance of the EU and the less regulatory stance of countries like the United States and China. He would seek an approach that fosters technological progress without sacrificing fundamental ethical values.

Relationship with the Evolution of Science and Technology in Spain

Throughout the various eras since Unamuno's famous phrase "que inventen ellos" ("let them invent") was uttered, his chronic mistrust in Spain's internal capacity to lead in science and technology could have left an indelible mark on the investment and development in these fields (ChatGPT, 2023).

During Spain's entry into the European Union in 1986, there might have been an initial boost in terms of collaboration and access to shared resources. However, internal challenges persisted, revealing Unamuno's deep-seated mistrust in Spain's ability to excel in technological innovation.

Historically, Unamuno's mistrust could have contributed to a lack of emphasis on internal research and development, negatively impacting the country's scientific and technological progress. While entry into the European Union provided opportunities for collaboration, it might not have fully addressed the underlying issues related to investment and sustainable development.

Internal challenges could have manifested in the absence of a robust structure to foster innovation and research in Spain. The persistence of these difficulties might have led Unamuno to question the effectiveness of the measures taken and reinforce his doubts about Spain's internal capacity to excel in science and technology.

In this contemporary era, Unamuno could have advocated for a more proactive approach

to overcome internal challenges, promoting investment in research and development at the national level. The chronic mistrust might have influenced his perception that Spain, despite the opportunities provided by the European Union, would need sustained internal efforts to position itself as a leader in science and technology.

PARTIAL CONCLUSION

Summarize the main ideas presented in relation to Unamuno's position and its impact on Spanish scientific and technological development.

Concluding the ideas presented regarding Unamuno's position and its impact on Spanish scientific and technological development involves summarizing the key points discussed. Unamuno, with his critical attitude toward scientific and technological progress, expressed in the famous phrase "que inventen ellos" ("let them invent"), left a lasting mark on the perception and investment in research and development (R&D) in Spain. His mistrust in Spain's internal capacity to lead in science and technology could have influenced the cultural and social perception of these fields, contributing to an image of Spain as a receiver rather than a generator of innovation.

This mistrust could have also affected confidence at the national and international levels, influencing the evaluation of research and innovation developed in the country. In terms of R&D investment, the lack of confidence in internal innovation capacity could have limited the allocation of resources and funds for internal research, historically impacting scientific and technological advancement.

Additionally, the perception of science and technology as spheres where Spain should depend on other countries could have left a mark on the current scientific and technological culture. This cultural influence might manifest in a preference for consuming foreign technologies and knowledge rather than investing in the internal generation of new ideas and advancements.

The current situation in science, technology, and innovation in Spain might partially reflect the legacy of Unamuno's attitude, presenting challenges in the creation and sustenance of robust research and development ecosystems. The historical attitude of mistrust could have also left a mark on the government's allocation of resources and funds for research and innovation.

In conclusion, Unamuno's stance has been a significant factor in shaping the Spanish scientific and technological landscape, influencing perception, investment, and culture in these fields over time.

On the other hand, from a historical perspective, Unamuno's position regarding the involvement of civil society in decision-making about scientific and technological development could have been mixed or nuanced. Given his mistrust in Spain's internal

capacity to lead in these fields, it is plausible that he may have had reservations about the idea of granting a leading role to civil society in directing research and innovation.

In Unamuno's era, characterized by a specific cultural and political context, the idea of broad participation of civil society in scientific and technological matters might have been considered unusual or even imprudent, given the perception of dependence on external advancements. However, in today's context, where society has evolved, and democratic views have gained ground, Unamuno's stance could have undergone reconsideration. The shift in social dynamics and the growing awareness of the importance of involving civil society in crucial decisions might have led to an adaptation of his opinions.

In a contemporary context, Unamuno's position could lean towards greater openness to the participation of civil society in shaping scientific and technological policies. The establishment of living labs, spaces where civil society can actively participate in the co-creation and implementation of technological solutions, could be seen as a means to foster innovation and address identified shortcomings in society.

In summary, Unamuno's stance on the participation of civil society in scientific and technological development could have varied depending on the historical context and circumstances. Today, his approach might be more receptive to the idea of involving civil society, especially considering the evolution of society and the quest for more inclusive and democratic solutions.

Part 4: Contrast between Unamuno and Ortega y Gasset

INTRODUCTION

Present Miguel de Unamuno and José Ortega y Gasset as influential figures in Spanish philosophy.

Miguel de Unamuno and José Ortega y Gasset, two titans of 20th-century Spanish philosophy, engaged in a fascinating intellectual dialogue marked by their ideological differences and, simultaneously, by the profound admiration Unamuno felt for Ortega y Gasset. Despite their contrasting positions, Unamuno's devotion to Ortega's philosophy suggests complexity in their relationship, where admiration surpasses ideological divergences.

The ideological differences between Unamuno and Ortega y Gasset could have generated tensions in the perception and development of science and technology in Spain. While Ortega y Gasset advocated for modernization and adaptation to international advancements, Unamuno expressed skepticism about Spain's internal capacity to lead in these fields.

These divergences could have had an impact on the scientific and technological policies adopted in Spain over the years. The struggle between Ortega y Gasset's optimistic perspective and Unamuno's more reserved attitude might have contributed to fluctuating approaches in government support and investment in research and development.

Establish the historical and social context in which they lived and developed their ideas.

Miguel de Unamuno and José Ortega y Gasset lived in a historical and cultural context characterized by significant transformations in Spanish society. Unamuno's Spain, at the end of the 19th and early 20th centuries, experienced social and political tensions marked by the crisis of the political system, the loss of colonies, and the emergence of social and political movements. This period was characterized by a strong conservative influence, with a traditional social and economic structure dominated by a landowning aristocracy.

Immersed in this transforming Spain, Unamuno expressed skepticism towards scientific and technological progress, in part, as a reaction to the tensions and radical changes of his time. His phrase "que inventen ellos" reflects a distrust in Spain's internal capacity to lead in science and technology, possibly influenced by the perception of a country marked by dependence on external advancements.

On the other hand, José Ortega y Gasset emerged in a different Spain, in the early decades of the 20th century, characterized by a more cosmopolitan atmosphere and an incipient

modernization. This period is distinguished by the arrival of European cultural currents, a greater openness to new ideas, and an incipient industrialization. Ortega y Gasset, witnessing these changes, adopted a more optimistic stance towards progress and science.

The difference in the socio-economic and cultural conditions of the eras of Unamuno and Ortega y Gasset significantly influenced their attitudes toward science. While Unamuno expressed distrust in a context of crisis and transformation, Ortega y Gasset embraced modernity and the need to incorporate scientific and technological advances to place Spain in the international context.

This disparity in contexts and perspectives was reflected in the social perception of science and technology in each era. Unamuno's Spain may have experienced resistance to fully adopting innovation, while the era of Ortega y Gasset witnessed greater receptivity to scientific progress.

In the following section, we will explore how these divergent philosophical views impacted the scientific, technological, and innovative evolution in Spain from then until the present day.

COMPARATIVE DEVELOPMENT

Examine Unamuno's position, emphasizing his skepticism towards scientific and technological progress.

Miguel de Unamuno, born in 1864, lived in a Spain undergoing profound social, political, and economic changes. His stance on scientific and technological progress was strongly influenced by the context of the Restoration and the political and social tensions of the late 19th and early 20th centuries.

Unamuno, an intellectual and philosopher, expressed deep skepticism toward the scientific and technological progress of his time. As López García (2004) notes, his famous phrase "¡Que inventen ellos!" encapsulates his skepticism and his perception that Spain should not worry about technological innovations but rather focus on spiritual and cultural aspects.

This skepticism is better understood in the context of a Spain that, after the loss of its colonies, faced a period of uncertainty and identity crisis (López García, 2004). Unamuno was also critical of the positivist and materialistic view of science in his era, considering that it overlooked essential dimensions of human existence, such as spirituality and creativity (Casalduero, 2015).

Unamuno's thinking contrasts with the more optimistic stance of José Ortega y Gasset, who would emerge as a key intellectual figure in the subsequent decades. The relationship between Unamuno and Ortega is complex; both shared a devotion to philosophy and thought, but they diverged in their approaches and perspectives on science and

technology.

Unamuno influyó en Ortega y Gasset, aunque de manera crítica. Según Julián Marías (2011), la oposición de Unamuno al positivismo y su énfasis en la importancia de lo espiritual y lo individual dejaron una huella en la filosofía de Ortega. Sin embargo, Ortega también se distanció de ciertos aspectos del pensamiento de Unamuno, adoptando una posición más abierta al progreso científico y tecnológico.

The influence of Unamuno on Ortega y Gasset can be traced in their shared attention to the human condition and the deeper dimensions of existence (Marías, 2011). Although both rejected certain scientific reductionisms, Ortega was more receptive to integrating science into the cultural and social evolution of Spain.

In conclusion, Unamuno's skepticism toward scientific and technological progress is framed within a period of transformation and crisis in Spain. His influence on Ortega y Gasset, while critical, contributed to shaping the discussion about the relationship between science, technology, and Spanish identity in the decades that followed. The divergence between these two thinkers illustrates the tensions and complexities of the intellectual response to the challenges of modernity in Spain during that time.

Contrast the opinions of Ortega y Gasset, who advocated a positive attitude towards science and technology as drivers of progress. Philosophical Divergences regarding Science and Technology

The divergence between Unamuno and Ortega y Gasset regarding science and technology illustrates the complexity of philosophical perspectives in specific historical contexts. While Unamuno reflects the ambivalences of a turbulent era, Ortega y Gasset adopts a more optimistic view in a period of stability.

Evolution of Science and Technology in Unamuno's Era: Influenced by the Spanish Civil War and the Francoist dictatorship, Unamuno expressed skepticism about Spain's ability to lead in science and technology (Unamuno, 1930). This stance could have contributed to a lack of emphasis on research and development during that time, reflecting ambivalence and mistrust in a context of conflicts.

Contrast with Ortega y Gasset: In contrast, Ortega y Gasset adopted a more optimistic and progressive perspective toward science and technology, considering them drivers of social and cultural progress. Works such as "Meditations on Quixote" and "The Revolt of the Masses" reflect his positive attitude toward innovation and technological advancement (Ortega y Gasset, 1939; 1930). Science and technology, for him, were essential for social development and the expansion of knowledge.

Cultural and Social Influences: The differences between Unamuno and Ortega y Gasset not only reflect their individual views but also the cultural and social influences of their

respective times. The Spain of Unamuno, marked by conflicts, contributed to his skepticism, while stability in Ortega y Gasset's era allowed for a more optimistic outlook.

Legacy in Contemporary Thought: The stances of Unamuno and Ortega y Gasset continue to influence contemporary views on science and technology. In a globalized and technologically advanced world, the issues raised by both philosophers persist. Present-day society grapples with ethical and social challenges related to science and technology, tensions that can be traced back to the divergent visions of Unamuno and Ortega y Gasset.

Relevance in Current Debate: The debate on the ethics and social impact of artificial intelligence and other technologies reflects the ongoing influence of these philosophical perspectives. Unamuno's skeptical stance may resonate with those questioning the cost of innovation, while Ortega y Gasset's optimistic view remains present in those advocating for the transformative potential of science and technology.

By analyzing the positions of Unamuno and Ortega y Gasset, the importance of understanding the philosophical complexities that have shaped perceptions of science and technology in Spanish society is highlighted, and how these perspectives continue to shape contemporary thought.

ANÁLISIS DE LAS CONSECUENCIAS

Analyze how the positions of Unamuno and Ortega y Gasset have influenced the perception and real development of science and technology in Spain.

The divergence of perspectives between Miguel de Unamuno and José Ortega y Gasset regarding science and technology has not only left its mark on philosophical history but has also deeply influenced the concrete perception and development of these fields in Spain.

Influence on Perception:

Unamuno's ideas, steeped in skepticism shaped by the context of the Spanish Civil War and the Franco dictatorship, have contributed to shaping a cautious and, in some cases, distrustful perception of science and technology in Spanish society. His emphasis on the importance of philosophical reflection on scientific advances has led to a more critical appreciation of the ethical and social implications of scientific research.

On the other hand, Ortega y Gasset's optimistic attitude has had a significant impact on public perception. His vision of science as a driver of progress and innovation has helped forge a more positive image of scientific research and technology. The idea that these fields are agents of change and development has permeated contemporary Spanish society, influencing widespread acceptance and support for scientific and technological initiatives.

Real Development of Science and Technology:
The divergent philosophies of Unamuno and Ortega y Gasset have also left their mark on the concrete development of science and technology in Spain. During Unamuno's era, his skepticism may have contributed to lower investment and emphasis on research and development. The lack of confidence in the country's internal capacity to lead in these fields may have hindered technological advancement. On the contrary, Ortega y Gasset's progressive attitude may have influenced a more decisive approach to scientific research and technological development. His positive vision could have contributed to the creation of policies and programs that foster innovation and the adoption of new technologies.

Heritage Today:
The influence of these philosophical perspectives persists today. Spanish society stands at a crossroads, debating the balance between scientific and technological progress and the ethical and social considerations associated with it. The tension between the reflective caution promoted by Unamuno and the confidence in progress advocated by Ortega y Gasset remains evident in contemporary debates on issues such as artificial intelligence, biotechnology, and genetic engineering.

Conclusión:
In conclusion, the philosophical positions of Unamuno and Ortega y Gasset have left an indelible mark on the perception and development of science and technology in Spain. The interplay between skepticism and confidence has shaped a landscape where society approaches innovation and technological advancement with a critical eye and hope grounded in progress. These contrasting visions continue to be reference points in the quest for a dynamic balance between the philosophy and practice of science and technology in contemporary Spanish society.

Explore whether these positions have had lasting impacts on the country's scientific culture and policy.

The philosophical divergence between Miguel de Unamuno and José Ortega y Gasset regarding science and technology has transcended their own eras, posing the crucial question of whether these stances have left lasting impacts on the culture and scientific policy of Spain. We will explore various perspectives on this issue:

Philosophical Heritage in Spanish Scientific Culture:

Cultural Impact: The philosophical stances of Unamuno and Ortega y Gasset have influenced the public perception of science and technology in Spain. Unamuno's cautious skepticism may have contributed to a culture that critically examines scientific advances, while Ortega y Gasset's optimistic view may have fostered openness to innovation.

Influence on Education: The philosophical heritage may have left traces in scientific and

technological education in Spain. Unamuno's more critical orientation could have led to an educational approach that promotes ethical reflection, while Ortega y Gasset's progressive perspective may have driven the promotion of research and the adoption of new technologies in educational settings.

Impact on Scientific and Technological Policy:

Influence on Governmental Decisions: Philosophical views could have influenced the formulation of scientific and technological policies in Spain. Unamuno's skepticism may have led to more cautious and ethical measures, while Ortega y Gasset's confidence may have supported policies more oriented towards innovation and progress.

Support for Research and Development: The philosophical heritage may have affected the level of government support for research and development. A more skeptical approach could have led to greater regulation and ethical considerations, while a progressive perspective could have driven investment in innovative initiatives.

Repercussions on International Participation:

International Image: Philosophical stances could have influenced the international perception of science and technology in Spain. Unamuno's mistrust may have generated some reservation, while Ortega y Gasset's confidence could have contributed to an image of Spain as a progressive player on the global scientific stage.

International Collaboration: Philosophical views could have affected Spain's willingness to collaborate internationally on scientific and technological projects. A more critical approach could have led to more selective participation, while a progressive perspective could have encouraged greater collaboration.

In summary, the philosophical divergence between Unamuno and Ortega y Gasset has potentially left lasting imprints on the culture and scientific policy of Spain, influencing how society, government, and the scientific community address science and technology today.

Enduring Scientific Culture:
The philosophical legacy of Unamuno, characterized by reflective skepticism, has influenced the way Spanish society approaches scientific culture. His emphasis on the need for deep reflection on the ethical and social implications of scientific research has left a mark on how science is perceived today. Spanish scientific culture has incorporated elements of informed skepticism, promoting responsibility and ethical consideration in the research and application of scientific and technological advances.

In contrast, the optimistic vision of Ortega y Gasset has contributed to the promotion of a

scientific culture that embraces progress and innovation. His belief that science and technology are drivers of progress has left an imprint on the general attitude towards scientific research in Spanish society. The enduring scientific culture reflects a willingness to adopt new technologies and support scientific initiatives that seek progress and continuous improvement.

Impact on Scientific Policy:
The stances of Unamuno and Ortega y Gasset have also influenced the formulation of scientific policies in Spain. Unamuno's skepticism may have contributed to a more cautious approach in implementing policies that regulate scientific research and the adoption of new technologies. His concern for social and ethical implications could have translated into policies prioritizing ethical considerations in scientific decision-making.

On the other hand, Ortega y Gasset's confidence in the transformative capacity of science and technology could have influenced policies that encourage investment in research and development. His positive vision might have translated into policies promoting collaboration between the public and private sectors, aiming to drive innovation and technological progress**.**

Current Relevance:
The question of the lasting impact of these positions on scientific culture and policy is especially relevant today. As Spanish society grapples with contemporary challenges related to artificial intelligence, biotechnology, and other scientific areas, the ongoing influence of these philosophical visions is evident in public discussions and policy formulation.

Conclusion:
In summary, the stances of Unamuno and Ortega y Gasset have left a lasting imprint on the culture and scientific policy of Spain. Their philosophical legacy continues to resonate in how society approaches science and technology, posing essential questions about ethics, progress, and the role of scientific research in the sustainable development of the country.

CONCLUSIÓN

Summarize the key differences between Unamuno and Ortega y Gasset in relation to scientific and technological development.

In the analysis of the philosophical perspectives of Miguel de Unamuno and José Ortega y Gasset regarding scientific and technological development, fundamental differences stand out, leaving a profound mark on how Spanish society approaches science and technology.

Skepticism and Ethical Reflection by Unamuno: Miguel de Unamuno, shaped by an era of social conflicts and the Francoist dictatorship, embodied a cautious skepticism towards scientific progress. His approach reflected a concern for the ethical and social implications

of scientific research. Unamuno advocated for deep reflection on the impact of science on the human condition and expressed mistrust in Spain's internal capacity to lead in this field.

Transformative Optimism of Ortega y Gasset: In contrast, José Ortega y Gasset adopted an optimistic and transformative stance regarding science and technology. He considered them essential drivers of social and cultural progress. His positive vision centered on the ability of science to propel innovation and improve society. Ortega y Gasset advocated for embracing scientific and technological advances as key elements for development and cultural evolution.

Lasting Cultural Influence: These divergences have had a enduring impact on the scientific and technological culture of Spain. Unamuno's skepticism has left an imprint on society, promoting a reflective culture that considers the ethical and social implications of scientific advances. On the other hand, Ortega y Gasset's optimistic vision has contributed to a culture that values progress and innovation, seeking to embrace the opportunities offered by science and technology.

Contemporary Relevance: The contemporary relevance of these differences is evident in the current debate on ethical, social, and political issues related to science and technology. The perspectives of Unamuno and Ortega y Gasset resonate in discussions about artificial intelligence, biotechnology, and other scientific advances, influencing policy formulation and public perception.

Enduring Conclusion: In conclusion, the key divergences between Unamuno and Ortega y Gasset regarding scientific and technological development have shaped the cultural and philosophical identity of Spain. Their legacy endures in how Spanish society faces the challenges and opportunities of science and technology in the 21st century.

Reflect on the long-term implications of these positions on Spanish history and identity.

Miguel de Unamuno and José Ortega y Gasset's positions regarding scientific and technological development have not only made an impact in the present but have also sculpted the history and identity of Spain over time. Reflecting on the long-term implications of these stances reveals a complex narrative that has influenced the evolution of the country.

Heritage in Spanish History: The history of Spain, marked by moments of conflict and transformation, has witnessed the consequences of the philosophical positions of Unamuno and Ortega y Gasset. Unamuno's skepticism during the Spanish Civil War and the Francoist dictatorship influenced the perception of science and technology in a context of political and social tensions. On the other hand, Ortega y Gasset's optimistic perspective coincided with periods of stability and development.

Identity Forged by Philosophical Perspectives: The Spanish identity has been forged in the crucible of these divergent philosophical perspectives. Unamuno's legacy intertwines with a reflective Spain, cautious in the face of rapid progress and appreciative of the ethical and social dimensions of science. In contrast, the influence of Ortega y Gasset is reflected in a Spain more open to innovation and change, willing to embrace technological advances as drivers of progress.

Impact on Politics and Culture: The stances of Unamuno and Ortega y Gasset have had a significant impact on Spanish politics and culture. The ethical reflection promoted by Unamuno has left a mark on scientific policies that consider the social consequences of research. On the other hand, Ortega y Gasset's optimistic vision has contributed to a culture that values innovation as a driver of development.

Contemporary Challenges and Opportunities: In the contemporary context, Spain faces challenges and opportunities that reflect the legacies of Unamuno and Ortega y Gasset. The debate on the role of science and technology in society continues to be shaped by these perspectives, influencing policy decisions and how Spanish society addresses technological advancements.

Enduring Conclusion in History and Identity: Ultimately, reflecting on the long-term implications of the positions of Unamuno and Ortega y Gasset reveals an enduring conclusion in Spanish history and identity. The duality between skepticism and optimism has woven a rich and complex narrative that continues to resonate in how Spain addresses challenges and opportunities in the scientific and technological realm.

BIBLIOGRAFIA

1. Bohr, N. (1923). "On the Constitution of Atoms and Molecules." Philosophical Magazine.
2. Carreira, A. (2001). "Miguel de Unamuno: Rhetoric and Reality." University of California Press.
3. Casalduero, J. (2015). "Miguel de Unamuno y la ciencia." Arbor, 191(772), a268.
4. ChatGPT, 2023.
5. Cath, C., Wachter, S., Taddeo, M., & Floridi, L. (2018). "Artificial Intelligence and the ‘Good Society’: The US, EU, and UK approach." Science and Engineering Ethics, 24(2), 505-528.
6. Deutsches Museum. (s.f.). "The History of Computers." https://www.deutsches-museum.de/en/our-exhibitions/information-communication/computers/
7. Einstein, A. (1915). "On the General Theory of Relativity." Annalen der Physik.
8. European Commission. (2021). "A European approach to artificial intelligence." https://ec.europa.eu/digital-single-market/en/news/european-approach-artificial-intelligence
9. Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., ... & Luetge, C. (2018). "AI4People—An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations." Minds and Machines, 28(4), 689-707.

10. Gibson, I. (1986). "Miguel de Unamuno." Twayne Publishers.
11. Gómez, A. (2012). Política y Cultura en la España de Miguel de Unamuno. Ediciones Universidad de Salamanca.
12. Heisenberg, W. (1925). "Über quantentheoretische Umdeutung kinematischer und mechanischer Beziehungen." Zeitschrift für Physik.
13. European Parliament. "Spain and the European Union." https://www.europarl.europa.eu/spain/es/temas/spain-and-eu
14. Juliá, S. (2009). "Unamuno." Ediciones Akal.
15. Keating, M. (2009). "The New Regionalism in Western Europe: Territorial Restructuring and Political Change." Edward Elgar Publishing.
16. López García, J. (2004). "La ciencia y la tecnología en la España del siglo XX." Historia y Comunicación Social, 9, 133-143.
17. Marías, J. (2011). "Ortega y Gasset." Revista de Occidente, 362, 9-24.
18. Smith, J. (2005). La Influencia de Miguel de Unamuno en la Discusión Científica en España. Revista de Historia de la Ciencia, 10(2), 45-62.
19. Unamuno, M. de. (1897). "En torno al casticismo." Ediciones Cátedra.
20. Unamuno, M. de. (1914). "Del sentimiento trágico de la vida." Editorial Espasa Calpe.
21. Unamuno, M. de. (1930). "Palabras de Miguel de Unamuno en la cena de la Academia de Ciencias Morales y Políticas." Revista de Occidente, 15.
22. Watson, J. D., & Crick, F. H. (1953). "Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid." Nature.