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The Myth of al-Ghazālī and Islamic Decline: A Historical Clarification and Review

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Abstract

This study aims to investigate the causes of the decline of scientific tradition in the Islamic world, considering three conventional theses proposed by liberal Muslim and Western intellectuals: internal and external factors. The first thesis attributes the decline to al-Ghazālī's supposed rejection of science as depicted in his *Tahāfut al-falāsifa* (The Incoherence of the Philosophers), followed by the Islamic world, leading to its decline. Meanwhile, the second thesis identifies the Mongol invasion of Baghdad in 1258 as the main cause. The last thesis stated that the decline causes by the banning of printing press by Ottoman Empire specifically at the time of Sultan Bayezid II in 1485 and Selim I in 1515. Applying historical analysis method, this research seeks to uncover the truth behind these theses by examining relevant literature. Surprisingly, the results contradict the initial assumptions. The first thesis is rejected as al-Ghazālī did not reject science but rather supported it. His views were misunderstood by his detractors. Additionally, after the al-Ghazālī era, science and philosophy continued to thrive in the Islamic world. Similarly, the second thesis is also refuted as science and philosophy persisted and developed despite the Mongol invasion of Baghdad. Within a year of the invasion, the *Maragha Observatory* was established under the guidance of Naṣīr al-Dīn al-Ṭūsī, a renowned Muslim scientist. This observatory became a global scientific hub, making significant contributions to mathematics and astronomy. The final proposition is similarly dismissed, as the Ottoman Sultans did not categorically dismiss the concept of the printing press; instead, they opted for a temporary restriction on its utilization within particular societal segments. This action was motivated by the apprehension that unrestricted access to the printing press among specific groups could possibly result in adverse political and economic outcomes for the larger Muslim community. To offer an alternative perspective, this study utilizes Janet Abu-Lughod's *European hegemonic approach*, stemming from Immanuel Wallerstein's *world-system theory*. By applying this approach, the author argues that the waning of scientific advancement in the Islamic world can be traced back to modern Western hegemony and its dominance over the Muslim realm.

Keywords The Decline of Scientific Tradition, al-Ghazālī's Philosophy of Science, *Tahafut al-Falasifa*, world-system theory, Western hegemony

Abstrak

Penelitian ini bertujuan untuk menyelidiki penyebab mundurnya ilmu pengetahuan atau kemunduran tradisi ilmiah di dunia Islam, mempertimbangkan tiga tesis konvensional yang diajukan oleh intelektual Muslim liberal dan Barat: faktor internal dan eksternal. Tesis pertama mengatribusikan kemunduran tersebut disebabkan adanya penolakan ilmu pengetahuan yang dimotori oleh al-Ghazālī dalam karyanya Tahāfut al-falāsifa (Kerancauan Para Filosof), yang kemudian tersebar dan diikuti oleh dunia Islam, mengakibatkan kemunduran. Tesis kedua mengidentifikasi invasi Mongol ke Baghdad pada tahun 1258 sebagai penyebab utama. Tesis terakhir menyatakan bahwa kemunuran disebabkan oleh larangan mesin cetak oleh Kesultanan Utsmaniyah, khususnya pada masa Sultan Bayezid II pada tahun 1485 dan Selim I pada tahun 1515. Dengan menerapkan metode analisis sejarah, penelitian ini bertujuan untuk mengungkap kevalidan ketiga tesis ini dengan meneliti literatur yang relevan. Hasil kajian menununjukkan bahwa ketiga tesis itu tertolak. Tesis pertama ditolak karena al-Ghazālī sebenarnya tidak menolak ilmu pengetahuan, tetapi justru mendukungnya. Pandangannya disalahpahami oleh para penentangnya. Selain itu, setelah era al-Ghazālī, ilmu pengetahuan dan filsafat terus berkembang di dunia Islam. Demikian pula, tesis kedua juga ditolak karena ilmu pengetahuan dan filsafat tetap bertahan dan berkembang meskipun invasi Mongol ke Baghdad. Dalam waktu setahun setelah invasi, *Observatorium Maragha* didirikan di bawah pimpinan Naṣ īr al-Dīn al-Ṭūsī, seorang ilmuwan Muslim terkemuka. Observatorium ini menjadi pusat ilmiah global, memberikan kontribusi signifikan pada bidang matematika dan astronomi. Argumen terakhir juga ditolak, karena Sultan-sultan Utsmaniyah tidak menolak konsep mesin cetak; sebaliknya, mereka memilih untuk membatasi penggunaannya secara sementara dalam segmen masyarakat tertentu. Tindakan ini disebabkan oleh kekhawatiran bahwa akses yang tidak terbatas kepada mesin cetak di kalangan kelompok tertentu dapat menghasilkan dampak politik dan ekonomi yang merugikan bagi komunitas Muslim yang lebih luas. Untuk menawarkan perspektif alternatif, penelitian ini menggunakan pendekatan hegemoni Eropa oleh Janet Abu-Lughod, yang bersumber dari teori sistem dunia Immanuel Wallerstein. Dengan menerapkan pendekatan ini, penulis berargumen bahwa kemunduran dunia Islam dapat ditelusuri kembali ke hegemoni Barat dan dominasinya atas ranah kaum dan negeri Muslim.

Kata Kunci: Kemunduran Tradisi Ilmiah, Filsafat Ilmu Pengetahuan al-Ghazālī, Tahafut al-Falasifa, teori sistem dunia, hegemoni Barat

Introduction

Initially, Imām al-Ghazālī (1058–1111) was criticized by the majority of French Orientalists, including Joseph Ernest Renan (1823–1892), a prominent French scholar of Semitic languages and an influential figure in Orientalist thought. Renan's critique of al-Ghazālī and Islamic theology formed part of a broader narrative that characterized Islam as intellectually stagnant and opposed to rational thought. Informed by the historical tensions between the Islamic world and the West, particularly during the Crusades, Renan argued that the decline of Islamic philosophy following Ibn Rushd's death marked the triumph of dogma over reason, with al-Ghazālī bearing much of the responsibility for this intellectual shift. He contended that figures like al-Ghazālī curtailed philosophical inquiry, reinforcing the perception of Islam as resistant to scientific and intellectual progress. This critique aligned with Enlightenment-era views that likened the intellectual stagnation of the Islamic world to that of pre-Enlightenment Europe, both depicted as mired in feudalism and irrationality.[1]

Renan's views, along with those of other French Orientalists like Hegel, were significantly shaped by Napoleon's 1798 invasion of Egypt, an event that marked the inception of modern Orientalist discourse. The French portrayed themselves as "liberators" of a backward Islamic society, with Napoleon even positioning himself as more aligned with Islam than the ruling Mamluks. This sense of European superiority permeated Renan's critique, framing Islamic theology as an impediment to intellectual progress. Alongside the broader Orientalist discourse, Renan's ideas contributed to the development of a persistent myth that Islamic civilization, and particularly al-Ghazālī, was responsible for the decline of its scientific tradition. This myth later provided ideological justification for Western imperialism, portraying the Islamic world as in need of Western rationality and modernity to escape intellectual stagnation.[2]

In the context of the decline of the Islamic scientific tradition, three prominent theses have been advanced by both liberal Muslim scholars and Western intellectuals. The first, closely aligned with Renan's critique, attributes the decline to al-Ghazālī, particularly his

[1] Frank Griffel, "The Western Reception of Al-Ghazālī's Cosmology from the Middle Ages to the 21st Century," *Dîvân: Disiplinlerarası Çalışmalar Dergisi* 16, no. 3 (2011): 33–62.

[2] Ibid.

work *Tahāfut al-Falāsifa*, which is often misinterpreted as discouraging scientific exploration. The second thesis blames the Mongol invasion, especially the sacking of Baghdad in 1258, as a major factor in the devastation of the intellectual and cultural core of the Islamic world. The third thesis highlights the Ottoman Empire's prohibition of the printing press, suggesting that this hindered scientific progress and intellectual development.

This study will critically evaluate these perspectives to assess their historical validity and determine whether they contribute to a distorted narrative about al-Ghazālī's role in the decline of the scientific tradition in Islamic civilization. By investigating these claims, this research seeks to clarify historical misunderstandings and offer a more nuanced understanding of the factors that led to the decline, challenging the prevailing myth that places undue blame on al-Ghazālī.

A Myth of The Islamic Decline

Imām al-Ghazālī, born in 1058 in Persia, stands out as a prominent Islamic scholar, jurist, philosopher, and a significant figure in Sufism. His education in traditional Islamic institutions was profoundly influenced by the teachings of Imām al-Ḥaramayn al-Juwaynī. Al-Ghazālī aligned himself with the Shāfi'ī school of jurisprudence and the al-Ash'arīte school of theology, establishing a foundation for his intellectual pursuits.

Despite his revered status, al-Ghazālī has often been misunderstood and faced criticism from both Western and Islamic scholars. Figures such as Georg Wilhelm Friedrich Hegel (1770-1831) indirectly criticized him, arguing that Arabic philosophy lacked a distinctive developmental phase in the evolution of thought.[3] Salomon Munk (1803-1867) perceived al-Ghazālī as a detrimental force to philosophy, while Ignaz Goldziher (1850-1921) contended that al-Ghazālī's critiques weakened an already declining philosophical tradition, leading to the destruction of numerous philosophical texts.[4] This negative portrayal has significantly influenced Western Islamic studies, with scholars like William M. Watt (1909-2006) asserting that al-

[3] Georg Wilhelm Friedrich Hegel, *Lectures on the History of Philosophy. The Lectures of 1825-26 Volume III: Medieval and Modern Philosophy* (California: University of California Press, 1990).

[4] Frank Griffel, *Al-Ghazālī's Philosophical Theology* (Oxford: Oxford University Press, 2009).

Ghazālī played a pivotal role in suppressing prominent philosophical figures in the Islamic world.[5] Moreover, Ibn Warraq[6] and Taner Edis[7] argue that al-Ghazālī's revival of Sunni orthodoxy stifled independent thought and scientific inquiry within Muslim communities. Ayaan Hirsi Ali further underscores al-Ghazālī's disdain for ancient Greek philosophers, depicting human reason as a potential threat to Islam, particularly highlighted in his work *Tahāfut al-Falāsifa* (The Incoherence of the Philosophers), which serves as a vigorous rebuttal against their philosophical claims.[8]

Indonesian Muslim scholars such as Komaruddin Hidayat, Amin Abdullah, and Harun Nasution echo these criticisms, particularly regarding al-Ghazālī's perceived rejection of rationalism and causality. Hidayat suggests that this rejection contributed to a decline in scientific inquiry in the Islamic world after the Middle Ages, as scholars increasingly focused on fiqh (Islamic jurisprudence) and Sufism.[9] In contrast, Nasution diverges from the al-Ash'arī theological framework, leaning towards Mu'tazilite theology.[10] These scholars, serving as influential university rectors, advocate for liberal Muslim perspectives that shape Islamic intellectualism in Indonesia and resonate with scholars across the nation.[11]

Critics often point to alleged inconsistencies in al-Ghazālī's work, claiming they diverge from his professed beliefs. A comprehensive examination of his writings reveals a coherent philosophical framework. Many misunderstandings stem from a superficial engagement with his corpus, which hinders a complete comprehension of his ideas. Moreover, Western analyses of the nineteenth century frequently portrayed him negatively,[12] influenced by imperialistic and colonial

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[5] Ibid.

[6] Ibn Warraq, *Why I Am Not a Muslim* (Amherst, N.Y: Prometheus, 2003).

[7] Taner Edis, *An Illusion of Harmony: Science And Religion in Islam* (Amherst, N.Y: Prometheus, 2007).

[8] Ayaan Hirsi Ali, *Heretic: Why Islam Needs a Reformation Now* (New York: Harper, 2015).

[9] Komaruddin Hidayat, "Islam, Science and Religion," Universitas Islam Internasional Indonesia, n.d., Islam, Science and Religion," Indonesian Internationahttps://uiii.ac.id/rector/speech/1614782716/islam_science_and_religion.

[10] H.M Rasjidi, *Koreksi Rasjidi Terhadap Harun Nasution Dalam Uraiannya: Ajaran Islam Tentang Akal Dan Akhlak* (Jakarta: Media Dakwah, 1985).

[11] H Zuhri and Muhammad Arif, "Al-Ghazalī (1058-1111) In The Eyes of Contemporary Indonesian Muslim Intellectuals," *Hamdard Islamicus* 46, no. 1 (2023), https://doi.org/doi.org/10.57144/hi.v46i1.512.

[12] F. Jamil Ragep, "Al-Ghazālī and Science" in Al-Ghazālī, An Exhibition Held in the

paradigms, skewing appreciation of his legacy.

In *Intentions of the Philosophers* (*Maqāṣid al-falāsifah*), al-Ghazālī offers a concise exploration of the thoughts of al-Fārābī and Ibn Sīnā, aiming to teach Neoplatonism to his students. His clear and impartial presentation led 13th-century European scholars to mistakenly attribute the ideas within the book to him, presuming he aligned with al-Fārābī and Ibn Sīnā.[13] In his later work, *Tahāfut al-Falāsifa*, al-Ghazālī expands upon his foundational treatise, delivering an intense critique of Neoplatonism. Unfortunately, this significant work was never translated into Latin, yet it greatly impacted Islamic scholarship. In it, he directly challenges philosophical views concerning theological and metaphysical issues, countering claims of neglect towards the natural sciences.

In *The Incoherence of the Philosophers*, al-Ghazālī critiques the philosophers' uncritical acceptance of Avicenna's ideas, which they presented as irrefutably logical. He systematically dismantles twenty key principles of Avicenna, deeming seventeen contrary to Islamic teachings and three tantamount to disbelief. Al-Ghazālī concludes starkly that those who assert beliefs such as the eternity of the world, denial of bodily resurrection, and denial of God's knowledge of particulars are non-Muslims and subject to the death penalty according to his fatwā.[14] He contends that these beliefs are fundamentally opposed to Islamic teachings, which are rooted in divine revelation. Consequently, he argues that individuals espousing such views cannot be considered true Muslims but rather apostates deserving of severe punishment according to Islamic law.[15]

Many Western scholars interpret al-Ghazālī's final declaration as evidence of his commitment to Islamic orthodoxy against philosophers. However, Griffel argues that this perspective reflects a tendency among Western academics to impose European Christian historical narratives onto Islamic history without adequate scrutiny. Historical records suggest that al-Ghazālī's fatwā had little historical significance. Nonetheless, his comprehensive critique of Avicenna's philosophy profoundly shaped the trajectory of Islamic intellectual discourse.

Humanities & Social Science Library," in *Al-Ghazālī and Science*, ed. Sean Swanick (Montreal Quebec: McGill University Library, 2011).

[13] Vernon O. Egger, *A History of the Muslim World to 1750: The Making of a Civilization* (Routledge, 2018).

[14] Griffel, *Al-Ghazālī's Philosophical Theology*.

[15] Ibid.

Al-Ghazālī's stance on natural science, often criticized for its perceived rejection, is better understood through an examination of his philosophical views. During his time, natural science was considered a branch of philosophy, rather than a distinct discipline as it is today. In *The Savior from Error* (*al-Munqidh min al-ḍalāl*), al-Ghazālī categorizes philosophy into six branches: mathematics, dialectics/logic, physics, theology/metaphysics, politics, and ethics.[16] This classification provides a framework for understanding his perspective on the interplay between philosophy and natural science.

Malik explores al-Ghazālī's views on mathematics in *Tahāfut al-Falāsifa*, highlighting two contrasting positions. The first warns against the inappropriate application of mathematical criteria, primarily derived from metaphysics, to various domains. Al-Ghazālī argues for a clear distinction between the realms of mathematics and metaphysics, emphasizing the importance of maintaining boundaries between different fields of inquiry.

> We have transmitted this story to let it be known that there is neither firm foundation nor perfection in the doctrine they hold; that they judge in terms of supposition and surmise, without verification or certainty; that they use the appearance of their mathematical and logical sciences as evidential proof for the truth of their metaphysical sciences, using [this] as a gradual enticement for the weak in mind. Had their metaphysical sciences been as perfect in demonstration, free from conjecture, as their mathematical, they would not have disagreed among themselves regarding [the former], just as they have not disagreed in their mathematical sciences.[17]

Al-Ghazālī's story underscores key criticisms of certain philosophers' doctrines. Firstly, he points out the lack of a sturdy foundation and coherent structure in their beliefs. Secondly, he critiques their reliance on conjecture over verification, suggesting their arguments lack solid evidence and rational scrutiny. Al-Ghazālī highlights how philosophers often leverage their proficiency in mathematics and logic to bolster their metaphysical assertions, aiming to sway those less discerning. He contends that if their metaphysical claims were as rigorously evidenced as their mathematical ones, internal disagreement within philosophical circles wouldn't be as

[16] Al-Ghazālī, *The Savior from Error (Al-Munqidh min al-ḍalāl)*, trans. Muhtar Holland (Florida: Al-Baz Publishing Inc, 2010).

[17] Al-Ghazālī, *The Incoherence of the Philosophers: A Parallel English-Arabic Text*, trans. Michael E. Marmura (Provo, Utah: Brigham Young University Press, 1997).

prevalent. This analogy underscores the philosophers' harmony in mathematical pursuits, contrasting with the discord in their metaphysical conjectures. Al-Ghazālī criticizes philosophers for their shaky foundation, dependence on conjecture, and use of math and logic to mask metaphysical assertions. He argues that their metaphysical disagreements expose broader weaknesses in their philosophical framework.

Al-Ghazālī elaborates on the second contrary perspective, which is articulated as follows:

> Second, the other dire consequence arises from a friend of Islam who is ignorant. He supposes that the religion ought to be assisted by rejecting every science connected with the philosophers. He therefore rejects all their sciences, and claims that they are ignorant of them. He goes so far as to reject what they say about the solar eclipse and the lunar eclipse, and maintains that what they say is contrary to the Sacred Law. Then, when that reaches the ears of someone who knows that what they say is based on definitive proof, he does not doubt its proof, but he becomes convinced that Islam is based on ignorance and denial of the definitive proof. He thus acquires a greater liking for the philosophers, and a greater distaste for Islam. A serious offense against Islam is committed by someone who supposes that Islam is helped by rejecting these sciences. The Sacred Law contains no reference to these sciences in the form of negation or affirmation, nor do these sciences contain any reference to religious matters.[18]

Al-Ghazālī highlights a crucial issue concerning supporters of Islam who lack comprehension. He warns against the harmful outcomes of those who mistakenly believe that strengthening the faith demands a complete rejection of philosophical knowledge. This mistaken stance leads them to dismiss all intellectual contributions from philosophers, claiming these scholars misunderstand sacred teachings. They go as far as rejecting philosophers' explanations of natural events, such as solar and lunar eclipses, arguing that these explanations contradict Islamic principles.

Al-Ghazālī argues that when those well-versed in both philosophy and Islamic theology hear the arguments of philosophers, it can lead to doubt not in the philosophers' evidence, but in Islam itself. This isn't about questioning the philosophers' proofs, but rather feeling that Islam is based on ignorance and denial of established truths. Consequently, such individuals tend to lean towards philosophical

[18] Al-Ghazālī, *The Savior from Error (Al-Munqidh min al-ʿalāl)*.

perspectives and distance themselves from Islam. Al-Ghazālī strongly condemns the rejection of scientific knowledge in Islam, warning against its detrimental effects. He argues that attempts to bolster Islam by shunning scientific fields are misguided. Islamic teachings, he explains, neither advocate for nor dismiss these sciences, as they do not pertain to matters of religious doctrine. Al-Ghazālī's message is clear: blindly rejecting scientific inquiry risks undermining faith and fostering admiration for opposing views.

Moreover, al-Ghazālī's perspective concerning the realm of physics is also notably lucid. Contrary to allegations of outright rejection, al-Ghazālī explicitly affirms that he did not dismiss physics. Al-Ghazālī articulates that, in a manner akin to the absence of any religious injunction mandating the rejection of medical science, a parallel absence exists with regard to the rejection of physics within the context of religious doctrine.[19] In addition, al-Ghazālī's perspective on logic is unambiguous. Al-Ghazālī states that logic holds no inherent positive or negative implications for Islam. He views logic as an examination of methods for testing evidence, criteria for proof, and the organization of valid definitions. The discipline involves either conceptualization, through definition, or verification, through proof. Al-Ghazālī asserts that there is no reason to reject logic, as it parallels concepts discussed by theologians and theoreticians, differing primarily in technical terms and the emphasis on definitions and nuances.[20]

In essence, al-Ghazālī's comprehensive stance toward philosophy, encompassing domains such as mathematics, physics, metaphysics, and logic, is discernible with clarity. Contrary to the allegations directed at him, his position did not involve any categorical denials. Consequently, it is unwarranted to attribute the decline of scientific pursuits within the Islamic world to al-Ghazālī's outlook. Furthermore, even in the aftermath of several centuries subsequent to al-Ghazālī's era, scientific endeavors continue to evolve and advance within the Islamic scholarly milieu.

Lastly, it is crucial to acknowledge that al-Ghazālī's impact extended notably to Western civilization. Vernon Egger noted al-Ghazālī's esteemed status among Latin translators and fellow Muslim scholars. Al-Ghazālī's and other Muslim scientists' works were

[19] Ibid.
[20] Ibid.

widely studied and translated into Latin.[21] Thomas Arnold and Alfred Guillame credit al-Ghazālī for in-depth study of various philosophies and theology, later translated into Latin through Toledo scholars.[22] Faris observed that Christian theologians like Raymund Martini quoted al-Ghazālī, while Thomas Aquinas and even later Western thinkers such as Descartes and David Hume showed resemblances in thought.[23] Al-Ghazālī and Descartes both disputed infallibility of senses; al-Ghazālī's causal theories shared similarities with David Hume's. These parallels highlight knowledge transmission from the Muslim to Western civilizations, evident in likenesses among figures like Raymund Martini, Thomas Aquinas, Descartes, and David Hume. Fundamentally, the resonance of Al-Ghazali's intellectual contributions, particularly exemplified through his treatises *Maqāṣid al-falasifah* and *Tahāfut al-falasifah*, exerted a substantial influence on subsequent Western philosophers.[24]

Do Mongols have a Role?

After careful scrutiny, it became clear that the accusations against al-Ghazālī didn't align with historical evidence or his beliefs. Instead, a new perspective emerged, suggesting that the decline of the Muslim world stemmed from the profound impact of the Mongol invasion.

Mohammad Iqbal from South Asian Studies Austria contends that the pinnacle of the Islamic empire's decline occurred in 1258 when Baghdad fell to the Mongols, signifying the end of the revered 'Golden Age' of Islam.[25] This catastrophic event, as Iqbal argues, had far-reaching implications that echoed through centuries, leading to a sustained period of adversity for Muslims, unable to regain their former prominence. The consequences of this downfall were profound, perpetuating a prolonged stagnation in Muslim society, marked by the erosion of economic and cultural vitality. This decline was exacerbated by the relocation

[21] Vernon O. Egger, *A History of the Muslim World to 1750: The Making of a Civilization*.

[22] Hamid Naseem Rafiabadi, *Emerging from Darkness: Ghazzali's Impact on the Western Philosophers* (New Delhi: Sarup & Sons, 2002).

[23] Nabih Amin Faris, *Al-Ghazzali in The Arab Heritage*, ed. N. A. Faris (Princeton: Princeton University Press, 1994).

[24] Yazid Said, "Yazid Said, Abū Ḥa◎ Mid al-Ghazālī◎s Legacy in Al-Ghazālī, An Exhibition Held in the Humanities & Social Sciences Libray," in *Al-Ghazālī* (Montreal Quebec: McGill University, 2011).

[25] Mohammad Iqbal, "The Impact of Mongol Invasion on the Muslim World and the Political, Economic and Social Ramifications," *Social Science Research Network (SSRN)*, 2021, http://dx.doi.org/10.2139/ssrn.3899594.

of educational and scientific centers to the West, further diminishing Muslim influence. As centuries passed, Muslim societies found themselves in a state of sustained debilitation, relegated to subordinate roles as traders and laborers. The majority of Muslims, living within diverse societal contexts, faced marginalization, with limited access to advanced education and prestigious career opportunities.[26]

Bernard Lewis challenges the prevailing perspective by underscoring two crucial flaws.[27] Firstly, he notes that significant cultural achievements in Islam, particularly in Iran, arose after the Mongol invasions, not before, undermining the argument of Islam's decline. Secondly, he asserts that the Mongols conquered an empire already weakened, making it improbable for a once powerful Caliphal Empire to fall to nomadic invaders had it not been in a state of vulnerability. This dual critique reframes the narrative, compelling a reevaluation of the historical dynamics at play.[28]

Jim Al-Khalili dismisses the argument as weak and oversimplified, suggesting that it reflects a narrow perspective possibly rooted in Baghdad's insularity. He argues that by the mid-thirteenth century, Baghdad no longer held a monopoly on scholarly activity within the Arabic-speaking world.[29] Instead, various thriving centers of scientific inquiry had emerged across regions like North Africa, Spain, Persia, and Central Asia. Influential scholars such as Ibn Sīna and al-Bīrūni likely never set foot in Baghdad. Thus, while the devastation of Baghdad in 1258 left a deep psychological mark on Islam, attributing disproportionate blame to this event oversimplifies a complex historical landscape.[30]

Despite the devastation of Baghdad in 1258, the Muslim world witnessed a remarkable trajectory of scientific advancement. According to George Saliba, the thirteenth century marked a period of sustained innovative scientific thinking.[31] Importantly, this era suggests that the decline of the Caliphal system of governance was, to some extent, a hidden blessing. Rather than signaling the end of scientific activity, its demise facilitated the emergence of other centers of scholarly production in secondary capitals like Diyar Bakr, Isfahan, Damascus,

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[26] Ibid.

[27] Bernard Lewis, "What Went Wrong?," *The Atlantic*, 2022.

[28] Ibid.

[29] Jim Al-Khalili, *Pathfinders: The Golden Age of Arabic Science* (London: Penguin, 2010).

[30] Ibid.

[31] George Saliba, *Islamic Science and the Making of the European Renaissance* (Massachusetts: MIT Press, 2007).

and Cairo. These centers continued to produce exceptional scientific works, demonstrating resilience and adaptability in the face of adversity.[32]

Put simply, the explanations suggesting a decline during that time don't fully make sense when we consider the many sources that show a significant increase in scientific progress. This phenomenon is evident both well after the demise of al-Ghazālī and the catastrophic event of the Mongol devastation of Baghdad. This is particularly evident when one focuses on the domain of astronomy. Those who attribute the age of decline to al-Ghazālī's influence are confronted with the challenge of elucidating the prolific output of numerous scholars spanning diverse disciplines. These scholars consistently produced scientific texts of remarkable quality, often surpassing the standards set before al-Ghazālī's time.[33]

Moreover, notable Muslim scientists who made substantial contributions post-al-Ghazālī era and in the aftermath of the Mongol invasion include figures like Abu I-'Izz ibn Ismā'īl ibn ar-Razāz al-Jazarī (c.1206) in the realm of mechanical engineering and physics, alongside Kamāl al-Dīn al-Fārisī (d. 1320) renowned in optics. In the realm of astronomy, several Muslim scientists made noteworthy contributions, including Mu◎ayyad al-Dīn al-'Ur◎ī (d.1266), Quṭb ad-Dīn ash-Shīrāzī (d. 1311), Ni◎ām al-Dīn al-Nīsābūrī (d. 1328), Ibn al-Shāṭir (1375) and his contemporary Ṣadr al-Sharī'ah al-Asghar (c.1350), Ala al-Dīn Ali ibn Muḥammad al-Qūshjī (d.1474), Mullā Faṭḥallāh al-Shīrwānī (c. 1450), and finally Shams al-Dīn al-Khāfrī (d. 1550), among others.

Of significant importance is the establishment of the Maragha observatory in 1259, precisely one year following the calamitous destruction of Baghdad. Situated in the contemporary East Azerbaijan Province of Iran, the Maragha observatory emerged as a seminal astronomical institution in the mid-13th century. It operated under the patronage of the Ilkhanid Hulagu and was under the stewardship of Naṣīr al-Dīn al-Ṭūsī (d. 1274), a distinguished Persian scientist and astronomer. This observatory gained renown for its groundbreaking contributions in mathematics and astronomy, positioning it as the world's premier center for astronomy.[34]

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[32] Ibid.

[33] Ibid.

[34] Jim Al-Khalili, *The House of Wisdom: How Arabic Science Saved Ancient Knowledge and Gave Us the Renaissance* (New York: Penguin Books, 2014).

Scientific Literacy

Upon rigorous examination, the hypothesis linking the decline of scientific advancement in Islamic societies to al-Ghazālī's viewpoints and the Mongol invasion of Baghdad has not been validated and contradicts established historical records. Consequently, an alternative proposition posits that the decline was prompted by an alleged prohibition on printing imposed by the Ottoman Empire. In their renowned work '*Why Nations Fail*,' Daron Acemoglu and James A. Robinson contend that starting in 1485, Ottoman Sultan Bayezid II instituted a ban on Muslims printing in Arabic, a policy reinforced by Sultan Selim I in 1515. The first instance of a printing press being allowed in Ottoman territories did not materialize until 1727.[35] This argument finds support from Jim Al-Khalili, who argues that a key contributing factor was the reluctance of the Muslim world, particularly the Ottoman Empire, to swiftly adopt the printing press.[36] Meanwhile, Diana Darke's recent publication "The Ottomans: A Cultural Legacy" reveals that in 1515, Sultan Selim introduced a decree influenced by conservative religious scholars, aiming to restrict knowledge dissemination to a limited group. This decree mandated capital punishment for those employing a printing press to create books in Turkish or Arabic.[37]

The origins of this argument can be traced to the work of André Thevet, a French author, and his publication "*Les vrais pourtraits*" in 1584, which provides biographical accounts of historical figures.[38] Within his entry on Johannes Gutenberg (found on page 514), Thevet briefly departs to contemplate the potential origins of movable type, suggesting its potential invention in China. He then asserts more firmly that a range of cultures, encompassing Greeks, Armenians, Georgians, Ethiopians, Turks, Persians, North Africans, Arabs, and Tartars, relied exclusively on manual transcription for producing books. Thevet specifically cites Bayezid II as a pivotal figure, claiming that in 1483 (as a clarification, not 1485), he issued a vaguely-worded proclamation that imposed the threat of death for utilizing printed books. Thevet

[35] Daron Acemoglu and James A. Robinson, *Why Nations Fail: The Origins of Power Prosperity and Poverty* (New York: Crown Business, 2012).

[36] Al-Khalili, *Pathfinders: The Golden Age of Arabic Science*.

[37] Diana Darke, *The Ottomans: A Cultural Legacy* (London: Thames & Hudson, 2022).

[38] André Thevet, "Les Vrais Pourtraits et Vies Des Hommes Illustres Grecz, Latins et Payens: Recueilliz de Leurs Tableaux, Livres, Médalles Antiques et Modernes" (par la Vesve, 1584), https://gallica.bnf.fr/ark:/12148/btv1b86246591/f1139.vertical#.

also notes that this decree gained the endorsement of Bayezid II's successor and son, Selim I, in 1515.

Anton Howes suggests that Thevet's reliability as an observer is questionable.[39] Furthermore, Howes states that Thevet had held the esteemed position of France's royal cosmographer since 1558, essentially functioning as the principal geographer responsible for aggregating various fragments of information garnered from travelers and assimilating their accounts into increasingly comprehensive depictions of the world. The appointment was likely a result of Thevet's own limited travels, having accompanied the French ambassador to the Ottomans between 1549 and 1554. Nevertheless, Thevet faced allegations of charlatanism and plagiarism even during his lifetime. More significantly, he introduced the mentioned edicts at the advanced age of 82, a full three decades after his visit to the Ottoman Empire.

Thevet was not alone in referencing a ban, though lacking details about Bayezid and Selim's edicts. Another traveler, the naturalist Pierre Belon, who accompanied the French ambassador in 1546-49, noted a similar restriction. In his 1553 account of his journey, Belon mentioned that Istanbul's Jewish community had a printing press producing materials in various languages, except Turkish and Arabic, which were prohibited.[40] Belon's account from 1553 provides the earliest known evidence that Jewish printers in Istanbul were prohibited from printing in Arabic or Turkish. The exact implication of this restriction on languages or characters remains uncertain; however, according to Howes it is more likely referring to characters. This is supported by the existence of early Arabic printing, which Belon had witnessed. In the 1520s, the Soncino dynasty of Jewish printers moved to Ottoman-controlled Thessaloniki and later to Istanbul in the 1530s. In 1546, a year prior to Belon's visit, they published the Torah in four languages - Aramaic, Hebrew, Persian, and Arabic - using the Hebrew alphabet for all.

Howes argues that the main body of evidence demonstrating Ottoman efforts to control printing activity overwhelmingly revolves around its utilization by non-Muslim entities. While the available evidence remains somewhat elusive and incomplete, a preliminary and speculative narrative is gradually emerging.[41] This narrative

[39] Anton Howes, "Did the Ottomans Ban Print?," *Age of Invention*, 2021, https://www.ageofinvention.xyz/p/age-of-invention-did-the-ottomans.

[40] Belon Pierre and Alexandra Merle, *Voyage Au Levant (1553): Les Observations De Pierre Belon Du Mans De Plusieurs Singularités & Choses Mémorables* (Paris: Éd. Chandeigne, 2021).

[41] Anton Howes, "Did the Ottomans Ban Print?," *Age of Invention*.

suggests that during the mid-16th century, Ottoman authorities exhibited concerns regarding the potential misuse of Arabic script in printing by non-Muslims. This apprehension was rooted in the fear of desecrating Islamic religious materials. Consequently, the authorities prohibited Jewish printers from engaging in such practices. Subsequently, suspicions escalated following an incident involving the Medici Press in the 1590s, wherein attempts were made to sell secular materials in Arabic script. This event cast doubt on the ulterior motives of foreign Christians and led to the imposition of book bans during periods of both conflict and peace. The rationale behind these bans rested on the belief that non-Muslim foreign printers would gain at the expense of local Muslim scribes. This sense of caution extended to presses utilizing non-Arabic scripts within the Ottoman Empire, especially in instances where foreign powers appeared to be inciting unrest. Thus, the Europeans' understanding of the justifications for the prohibition of Arabic script printing was influenced by the missionary and commercial agendas of European actors.[42]

Despite the Ottoman restrictions on printing, a parallel development was unfolding in Europe, where interest in Islamic manuscripts flourished. In the 17th and 18th centuries, European scholars and collectors were deeply engaged in acquiring Arabic, Persian, and Turkish manuscripts from the Islamic world. Antoine Galland, a prominent French scholar, exemplified this trend. Tasked by the French crown to gather books in Istanbul, Galland navigated the bustling book markets of the Ottoman capital, where Islamic manuscripts were readily available. He was not alone; European collectors across the continent eagerly sought to obtain these manuscripts.[43]

This growing fascination with Islamic texts transformed European libraries and intellectual life. Major institutions like the Bodleian Library in Oxford, Leiden University Library, and the French Royal Library amassed significant Oriental collections, enriching their scholarly resources. These collections were sourced not only from the Ottoman Empire but also from other regions, including Morocco, Persia, and Spain. Smaller libraries and private collectors in cities like Paris further contributed to the acquisition of Islamic manuscripts.[44]

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[42] *Ibid.*

[43] Alexander Bevilacqua, *The Republic of Arabic Letters: Islam and the European Enlightenment* (Cambridge, Massachusetts; London, England: Belknap Press of Harvard University Press, 2018), 17.

[44] Ibid., 18.

The collection of these manuscripts reflected a broader cultural phenomenon in Europe. Islamic books were not merely scholarly resources but symbols of foreign knowledge and intellectual prestige. They played a key role in shaping European thought, particularly during the Enlightenment. The careful cultivation of linguistic expertise to study these works underscored the importance of preserving and understanding Islamic intellectual traditions. This process laid the groundwork for future Oriental scholarship in Europe, as scholars sought to engage with and learn from the rich heritage of the Islamic world.[45]

European Hegemony: A Critical Analysis of Historical Nexus

The Silk Road and the Maritime Trade Routes of the Arabs (Muslim) in 11th and 12th centuries

The Silk Road, enduring for 1,500 years, traces back its origins approximately 1,000 years before its official establishment around 139 BCE during the Han dynasty's unification of China. Spanning from Changan (Xian) to Antioch or Constantinople (Istanbul), it passed through commercial hubs like Samarkand and Kashgar. Beyond trade, the Silk Road facilitated cultural and religious exchanges, disseminating Buddhism and later Islam across Europe, the Middle East, and Asia.[46]

Bentley, Bridenthal, and Wigen explain that both the medieval Christian West and the Islamic Middle East initially gained their knowledge of the Indian Ocean from Greco-Roman geographical traditions, especially as seen in Ptolemy's Geographia. However, after the early Muslim conquests, scholars in Islamic regions significantly expanded this knowledge. The growth of an extensive Muslim trading network across the Indian Ocean played a major role in this expansion. As Muslim merchants and scholars traveled more along these routes, they began writing about their destinations. Simultaneously, Muslim pilots and ship captains created practical sea lane guides and itineraries.[47]

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[45] Ibid., 19.

[46] Rodrigue Jean-Paul, *The Geography of Transport Systems* (London: Routledge, 2020).

[47] Jerry H. Bentley, Renate Bridenthal, and Kären Wigen, *Seascapes: Maritime Histories, Littoral Cultures, and Transoceanic Exchanges* (Hawai: University of Hawai◉i Press, 2007).

In the 9th century, maritime routes gained prominence with Arab (Muslim) traders, gradually overshadowing the Silk Road's significance. Islam's spread was further promoted through trade, aligning with its ethical and commercial principles. Maritime routes, less constrained than caravans, offered greater trading capacity. Originating in Guangzhou, the primary maritime route extended across Southeast Asia, the Indian Ocean, and the Red Sea, ultimately reaching Alexandria. Another route reached the 'Spice Islands' (Maluku Islands) in Indonesia, renowned for exclusive spices such as nutmeg, mace, and cloves.[48]

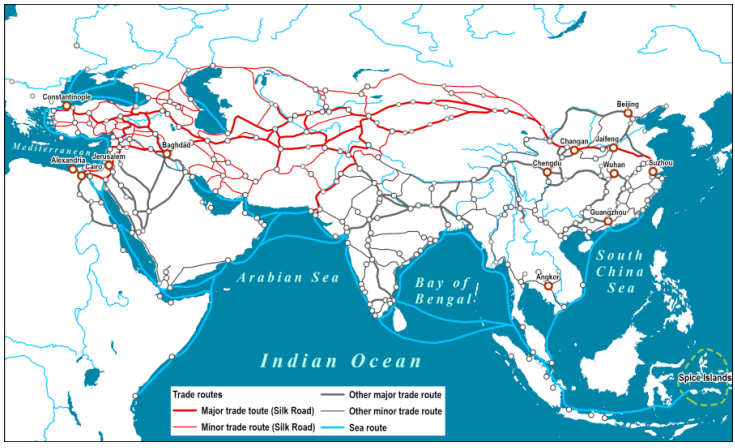

Figure 1. The Silk Road and the Maritime Trade Routes of the Arabs (Muslim) in 11th and 12th centuries. (Source: Jean-Paul Rodrigue, 2020)[49]

From its inception, astronomy was viewed as a science dedicated to supporting Islam. Precise astronomical observations could offer believers essential tables, charts, and methods for accurately establishing prayer times, the start and end of Ramadan fasting, and the crucial qibla direction for Mecca. This association proved beneficial for both sides, as Islam granted social validation to astronomy and allowed astronomers the pretext and chance to delve into intriguing scientific challenges that might not have been solely tied to this religious 'service.'[50]

[48] Ibid.

[49] Ibid.

[50] Al-Khalili, *The House of Wisdom: How Arabic Science Saved Ancient Knowledge and Gave Us the Renaissance*.

Hence, the author suggests that the rapid advancement of maritime trade within Islamic civilization can be largely attributed to the significant progress achieved in astronomy by Muslim scholars. This progress was driven by the vital need for precise navigation at sea, emphasizing the essential role of celestial observations and calculations in enabling successful maritime exploration and trade. As navigational expertise in Islam is linked to religious duties like knowing prayer and fasting schedules, it is imperative to share this knowledge rather than keeping it concealed. Islam promotes the dissemination of knowledge, discouraging monopolization or secrecy. The Prophet conveyed that *anyone who possesses knowledge and withholds it when asked will face the consequences, described as being bridled with a fiery restraint*.[51]

Islamic Science and the Renaissance in Europe: The Copernican Relationship

The history of Arabic astronomy is characterized by its extensive range, containing a greater number of astronomical texts in Arabic than the combined total in Greek and Medieval Latin. Numerous crucial advancements in medieval astronomy were formulated by Arabic scholars, who remained relatively unfamiliar to Europe. Naṣīr al-Dīn al-Ṭūsī (1201-1274), a notable Sufi philosopher and mathematician, is a prominent figure among them.[52] Other significant individuals encompass Mu◎ayyad al-Dīn al-'Ur◎ī (d. 1266), responsible for overseeing the establishment of the observatory, Qutb al-Din al-Shirāzi (1236-1311), a distinguished disciple of al-Tūsi, and later, Ibn al-Shāṭ ir (1304-1375), an astronomer based in Damascus. These luminaries were affiliated with the Maragha Observatory, also recognized as the Maragha School. Their astronomical knowledge traversed to Europe, particularly Italy, during the fifteenth century, facilitated by Byzantine Greek intermediaries.[53]

Under the leadership of al-Tūsi, Marāgha transformed into more than a mere observatory; it assumed a pivotal role in the resurgence of various sciences. Particularly significant was its association with what contemporary historians label the *Marāgha Revolution* – a school of thought that embraced the formidable challenge initially posed by

[51] At-Tirmidhī, *English Translation of Jami At-Tirmidhi (Al-Jami' al-Mukhtaṣar Min as-Sunan 'an Rasūl Allāh)*, trans. Abu Khaliyl (Riyadh: Darussalam, 2007).

[52] N. M. Swerdlow, Herman H. Goldstine, and O. Neugebauer, *Mathematical Astronomy in Copernicus's De Revolutionibus* (New York: Springer-Verlag, 1984).

[53] *Ibid*., 142.

Ibn al-Ḥaytham to revolutionize Ptolemaic astronomy. Among al-Tūsi's notable contributions, his Memoir on Astronomy (al-Ta◎kira fī 'ilm al-ḥayāh) stands out as a paramount achievement. This work holds universal recognition as the preeminent and inventive text on medieval astronomy. Within its pages, al-Tūsi unveils a geometric concept now referred to as a *Tūsi-couple*.[54] This innovation involves a petite circle orbiting the inner circumference of a larger circle, with a diameter twice that of the former.[55]

Central to the Maragha School, as outlined by George Saliba, are '*Urdi's lemma* and the *Al-Ṭūsī Couple*, two pivotal mathematical theorems. These theorems facilitated the transfer of segments between the central and peripheral portions of Ptolemaic models, retaining the equant effect and devising uniform motion sets in adherence to physical principles.[56] The *Al-Ṭūsī Couple* further enabled the generation of linear motion through combinations of circular motion, enabling scholars like Ibn al-Shāṭir and later Copernicus to manipulate epicyclic radii solely through uniform circular motion or their combinations.[57] What was essential, and indeed utilized by Copernicus, was the incorporation of two novel mathematical propositions. These theorems were originally formulated around three centuries prior to Copernicus and were employed by astronomers within the Islamic sphere to specifically amend Greek astronomy.[58]

Swerdlow, Goldstine, and Neugebauer note that the Maragha theory reached Italy, particularly Padua, during the late fifteenth and early sixteenth centuries. This suggests that Copernicus (1473-1543) might have acquired this knowledge during his time in Padua, as evidenced by the close alignment of his planetary longitude theory with Maragha models, particularly those of Ibn al-Shāṭir.[59]

Nosonovsky pointed out that *Al-Ṭūsī Couple* is regarded by experts in the field of astronomy as a crucial component within the

[54] E.S. Kennedy, "Late Medieval Planetary Theory," *The University of Chicago Press* 57, no. 3 (1966), https://doi.org/10.1086/350144.

[55] Jim Al-Khalili, *The House of Wisdom, 421*.

[56] Willy Hartner, "Copernicus, the Man, the Work, and Its History," *Proceedings of the American Philosophical Society* 117, no. 6 (1973): 413–22, http://www.jstor.org/stable/986460.

[57] George Saliba, "Arabic Planetary Theories after the Eleventh Century AD," in *Encyclopedia of the History of Arabic Science. Volume 1 Astronomy - Theoretical and Applied*, ed. Rushdī Rāshid and Régis Morelon (London: Routledge, 1996), 58–127.

[58] George Saliba, *Whose Science Is Arabic Science in Renaissance Europe?* (Columbia: Columbia University, 1999).

[59] Ibid.

Copernican heliocentric framework.[60] Scholars specializing in the history of astronomy have demonstrated that astronomers from the *Maragha School* during the 13th century came remarkably close to uncovering the *heliocentric planetary arrangement* later expounded upon by Copernicus. While these astronomers did not explicitly propose the sun's central position in the planetary arrangement, their mathematical methodology closely mirrored that which was adopted by Nicolaus Copernicus, distinctly different from the earlier approach of the geocentric Ptolemaic model. Additionally, there exists indirect proof indicating that Copernicus (1473–1543) was acquainted with the contributions of Naṣīr al-Dīn al-Ṭūsī (1201–1274), the architect of the *Maragha observatory*, and that al-Ṭūsī's revelations played a pivotal role in finalizing the Copernican system. Nonetheless, Nosonovsky asserts that the mechanism through which the insights of Muslim scholars were transmitted to Europe remains a subject of ongoing debate.[61]

Furthermore, Nosonovsky states that in 1973, Willy Hartner presented evidence suggesting that Copernicus likely had familiarity with al- al-Ṭūsī's contributions.[62] This proposition is grounded in the remarkable resemblance between the illustrations found in Copernicus' work "*De Revolutionibus orbitum celestium*" and those in al-Ṭūsī's "*Tadhkira fi 'ulm al-haʿya*." Copernicus adopted a Latin notation for his diagrams, which intriguingly mirrored the Arabic notation employed by al-Tūsi. This correspondence is evident in the correspondence between Arabic letter ا ('Alif) and Copernicus's use of "A", as well as between Arabic letter ب (Ba) and Copernicus's use of "B," and so forth.[63] Refer to the illustration provided bellow.

[60] Michael Nosonovsky, "Abner of Burgos: The Missing Link between Naṣīr al-Dīn al-Ṭūsī and Nicolaus Copernicus?," *Zutot* 15, no. 1 (2018): 25–30, https://doi.org/doi: https://doi.org/10.1163/18750214-12151070.

[61] Ibid.

[62] Willy Hartner, "Copernicus, the Man, the Work."

[63] Saliba, *Islamic Science and the Making of the European Renaissance*.

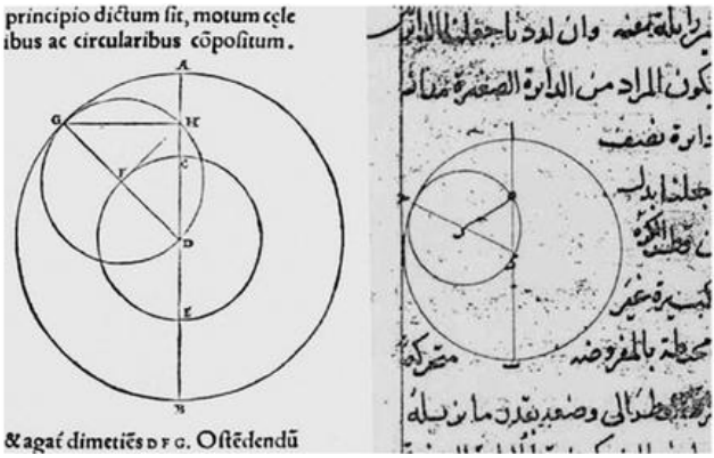

Figure 2. It shows Ṭūsī's couple by al-Ṭūsī in 1261 (right) and Copernicus's version from 1543. (Source: Nosonovsky, adapted from George Saliba)[64]

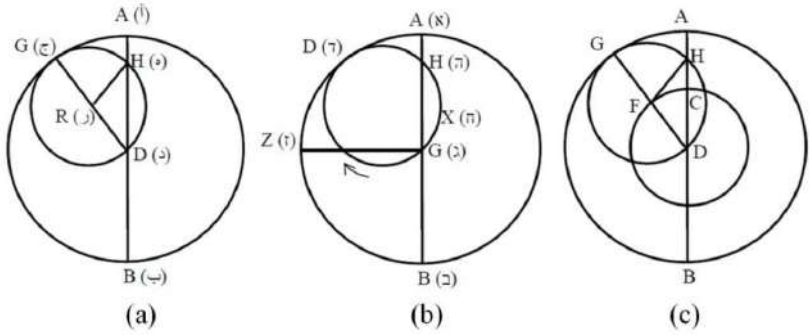

Figure 1.3: (a) Shows the Ṭūsī couple setup with a small sphere rotating on a larger one, causing point A to oscillate along AB. Arabic notation by Ṭūsī, annotated by Hartner. (b) Abner's vision. (c) Copernicus' illustrations and symbolic representation. Source: Michael Nosonovsky.[65]

Fresh evidence caught the attention of Nosonovsky, revealing that the concept of the *Al-Ṭūsī couple* also finds mention within a Hebrew

[64] Saliba, *Whose Science Is Arabic Science in Renaissance Europe?*

[65] Michael Nosonovsky, "Abner of Burgos: The Missing Link between Naṣīr al-Dīn al-Ṭūsī and Nicolaus Copernicus?,"

medieval treatise titled "בוקע רשינ Meyasher 'aqov" (Rectifying the Curved), authored by Abner of Burgos, a Spanish Jewish figure known as Alfonso de Valladolid following his conversion to Christianity, and who lived around 1270–1340.[66] This treatise, initially composed in Hebrew, was brought to light and translated into Russian by Gita Gluskina in 1983, drawing from a medieval manuscript. Although the central theme of Meyasher 'aqov diverges from al-Ṭūsī and Copernicus, it incorporates the Al-Ṭūsī couple as just one among numerous examples. This inclusion stands as evidence of Abner's acquaintance with Al-Ṭūsī's work, consequently establishing the presence of this knowledge within Europe. Notably, a substantial number of medieval Arabic scientific texts underwent a process of translation into Hebrew and subsequently into Latin by Spanish Jewish scholars. Additionally, Nosonovsky states that Abner's symbolic notation bears a certain degree of resemblance to that of Al-Ṭūsī and Copernicus. For instance, while Al-Ṭūsī employs the Arabic letter ا ('Alif) and Copernicus uses "A", Abner employs the Hebrew א ('Aleph). Similarly, where Al-Ṭūsī utilizes ب Ba and Copernicus opts for "B", Abner employs the Hebrew ב (Bet), and so forth.[67]

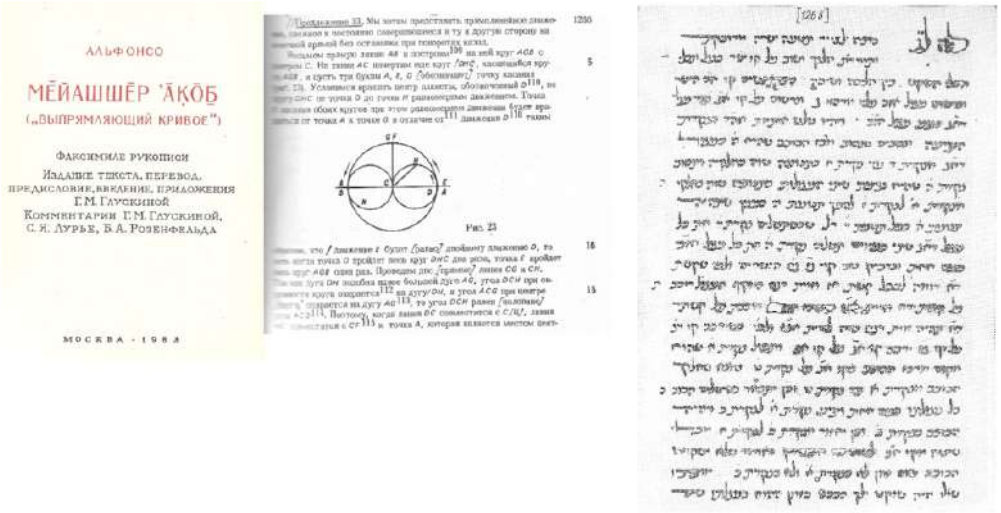

Figure 4. The cover page of Gluskina's publication (left).The Russian translation crafted by Gluskina (center) and the right side

[66] Ibid.
[67] Ibid.

is the authentic Hebrew manuscript authored by Abner, featuring "Statement 33" which is commonly recognized as the Al-Ṭūsī couple (Source: Michael Nosonovsky).[68]

Initially, European geographical understanding of the Indian Ocean during the post-Ptolemaic era appears to have evolved in an entirely different manner. In principle, surviving medieval Western *mappaemundi* draw from the classical Greco-Roman traditions, much like the scholarship of their Islamic counterparts. However, in practice, Western *mappaemundi* appear to have functioned as symbolic depictions of the medieval Christian cosmos rather than aiming to accurately represent the world. These maps reveal a significant lack of knowledge about the Indian Ocean and any area located to the east of Jerusalem.[69]

Nicolaus Copernicus's revolutionary heliocentric model, suggesting that the sun was at the center of the solar system with planets, including Earth, orbiting around it, not only transformed the field of astronomy but also left a lasting impact on navigation systems in Europe.[70] This shift from the prevailing geocentric view, where Earth was considered the center of the universe, laid the foundation for a new era of scientific thought.[71] While the direct influence of Copernicus's model on navigation was limited, its conceptual framework fostered an intellectual environment that fostered the development of more advanced navigation techniques.[72]

A significant contribution of the Copernican revolution to navigation was the progress it catalyzed in celestial navigation. Before Copernicus's model gained prominence, the geocentric perspective complicated accurate predictions of celestial bodies' positions, crucial for navigation.[73] Copernicus's heliocentric model, by providing a more precise understanding of celestial movements, indirectly facilitated improved navigation accuracy.[74]

Fundamentally, after assimilating the knowledge transmitted by Muslims and refining it through the contributions of individuals such

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[68] Ibid.

[69] Jerry H. Bentley, Renate Bridenthal, and Kären Wigen, *Seascapes, 87-88.*

[70] Owen Gingerich, *The Book Nobody Read: Chasing the Revolutions of Nicolaus Copernicus* (New York: Penguin Books, 2005).

[71] Ibid.

[72] Dava Sobel, *A More Perfect Heaven: How Copernicus Revolutionized the Cosmos* (New York: Walker & Company, 2012).

[73] Ibid.

[74] Owen Gingerich, *The Book Nobody Read.*

as Copernicus, who utilized mathematical principles from Naṣīr al-Dīn al-Ṭūsī and Ibn al-Shāṭir, their comprehension of navigation underwent a substantial evolution. This progress eventually provided them with the capability to effectively control and establishes supremacy over maritime trade pathways.

The Decline and the Dominance of the Western 'New World Order' Across the Globe

Prior to the 16th century, trade routes were universally entwined with the Islamic world, showcasing the dual impact of trade on both commerce and cultural exchange, fostering advancements. This trade acted as a catalyst for economic vibrancy, evidenced by the intricate trade routes within the Islamic world that generated substantial wealth. Notably, even amid conflicts and internal strife, the continuous generation of wealth within these networks played a pivotal role in nurturing exceptional scientists.

By 1650, Europeans had forcefully acquired command over crucial ports and resources in the region through both coercion and monopolistic tactics. Thus, according to Abu-Lughod, the alteration of trade routes led to a gradual decline in the economic and political dominance of the Islamic world.[75] Wallerstein posited that the post-16th-century "modern" world system evolved into a hierarchical structure based on distinct modes of production (capitalist, semi-feudal, pre-capitalist), each tied to specific geographic regions. This arrangement involved a capitalist core in northwest Europe, an agrarian semi periphery in eastern and southern Europe, and a periphery spanning the rest of the world.[76]

According to World-systems theory suggests that as capitalism has grown and evolved, forming different stages and dominant cycles, it has established periphery regions.[77] These regions are structured to fulfill essential roles within the capitalist global economy. The developments within these regions have not only perpetuated their existence but have also contributed to the recurring cycles and broader

[75] Janet Abu-Lughod, *Before European Hegemony: The World System A.D. 1250-1350* (New York: Oxford University Press, 1991).

[76] Immanuel Maurice Wallerstein, *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century* (New York: Academic Press Inc, 1974).

[77] Philip E. Steinberg, *The Social Construction of the Ocean* (Cambridge: Cambridge University Press, 2001).

course of the global system. Subsequently, Western powers initiated maritime expeditions aimed at asserting control and establishing monopolies over previously uncharted regions, often including territories inhabited by Muslim communities. This marked the advent of a distinct phase in European colonialism, characterized by practices of monopolization and exploitation. These traits not only defined European colonization but endured as enduring attributes of the colonial enterprise, persisting well into the 20th century.

During the era of Western imperialism, European colonialism predominantly operated through monopolistic practices. Portuguese settlers obtained exclusive trade rights along Senegal's creeks and shores, resulting in them being referred to as "the rivers of Cape Verde." In a different part of the world, Barbadians played a pivotal role in the colonization of South Carolina.[78] Moving to the 17th century, Makassar, a South Sulawesi state with significant spice trade, resisted the Dutch VOC's bid to monopolize nutmeg and clove commerce, ultimately changing the trade landscape following the Dutch takeover.[79] Meanwhile, the Spanish empire established its roots through empowering individuals in Atlantic enclaves for exploration and colonization. Columbus applied a monopoly-centered captaincy model in his early voyages, influenced by his Genoese background.[80] European colonial shipping took hold of oceanic transportation, propelling trans-Atlantic trade centered around coastal cities. During this period, Renaissance intellectuals envisioned a world characterized by islands and archipelagic empires, prioritizing access to goods over territorial dominance.

While the Renaissance propelled Western advancement, it spelled catastrophe for the East, fueling European ventures into colonization and imperialism. Ironically, the advent of 21st-century globalization, endorsed by formidable international financial institutions, multinational corporations, and influential governments, paradoxically resulted in the impoverishment of the most vulnerable segments of the world population, rather than fostering their progress.

[78] Jerry H. Bentley, Renate Bridenthal, and Kären Wigen, *Seascapes, 29.*
[79] *Ibid.*, 57.
[80] *Ibid.*, 77.

Table 1: Key Historical Timeline of Islamic Civilization and the Rise of Western Hegemony through Colonialism and Imperialism

Period	Time Frame	Major Events/ Notes	Islamic Civilizations	Western/Global History
Ancient Period	200 BCE - 1 CE			Birth of Christianity (1 CE)
Early Middle Ages	1 CE - 500 CE			Fall of Western Roman Empire (476 CE)
Islamic Age Begins	610 CE	Birth of Islam		
Rashidun Caliphate	632 - 661 CE	Early Caliphate established after Prophet Muhammad's death	Rashidun Caliphate	
Umayyad Caliphate	661 - 750 CE	First Muslim dynasty	Umayyad Caliphate	
Abbasid Caliphate	750 - 1258 CE	Period of cultural, scientific advancements in Islamic world	Abbasid Caliphate	
Viking Age	793 - 1066 CE			Viking invasions and exploration
Mongol Empires	1206 - 1368 CE	Mongols invade much of Eurasia		Mongol Empires
Crusades	1095 - 1291 CE	Series of religious wars between Western Christians and Muslims		Crusades between Christian Europe and Islamic regions

Period	Time Frame	Major Events/ Notes	Islamic Civilizations	Western/Global History
Ottoman Empire	1301 - 1922 CE	One of the longest and most influential empires in Islamic history	Ottoman Empire	
Mughal Empire	1526 - 1857 CE	Islamic rule in the Indian subcontinent	Mughal Empire	
Safavid Empire	1501 - 1736 CE	Major Shia Islamic dynasty	Safavid Empire	
Scientific Revolution/ Enlightenment	1650 - 1800 CE			Rise of scientific thought and rationalism in Europe
Colonial Period	16th - 20th century	European powers colonize large parts of the world		Age of Discovery, Expansion, and European colonialism
World War I	1914 - 1918 CE			WW1
World War II	1939 - 1945 CE			WW2
Cold War	1945 - 1991 CE			Cold War between USA and USSR

The West's hegemony began to take shape after the decline of the earlier world system that linked Europe, the Middle East, and Asia between 1250 and 1350 CE, as discussed in Janet Abu-Lughod's book *Before European Hegemony*.[81] This earlier world system emphasized interdependence among regions through complex trade networks rather than a singular dominance by any one area. The Mongol Empires

[81] Janet Abu-Lughod, *Before European Hegemony: The World System A.D. 1250-1350* (New York: Oxford University Press, 1991).

(1206-1368 CE) and the Islamic empires, particularly the Abbasid Caliphate, played significant roles in facilitating trade across these regions, fostering economic and cultural exchanges. The decline of this world system around 1350—exacerbated by the Black Death and the disintegration of Mongol authority—set the stage for the rise of Western dominance. After this decline, Europe began its ascent, culminating in the Age of Discovery during the 16th century. This marked a significant shift, as European powers began to establish colonial empires across the globe, initiating a period of extensive colonization that fundamentally altered the political and social landscapes of various regions, including the Muslim world.

The colonial period, highlighted in the table, reflects the aggressive expansion of Western powers, which sought to control vast territories and resources. The establishment of colonial empires facilitated the spread of Western ideologies, including nationalism, which often created divisions within colonized societies. The promotion of Western interests was systematic, permeating every aspect of life in colonized nations, including educational, political, and economic spheres. The table also illustrates the aftermath of World War I and World War II, during which the West solidified its dominance over global affairs. The geopolitical landscape that emerged post-war was characterized by the establishment of international organizations such as the World Bank and the International Monetary Fund (IMF).

These institutions were designed to maintain Western hegemony and exert influence over developing countries. According to Richard Werner, a leading German economist specializing in banking and development, the frameworks established by these organizations often prevent development in these nations, as their policies typically align with Western interests rather than the needs of the countries they aim to assist.[82] This results in a cycle of dependency that limits the potential for genuine autonomous growth and development in the developing world. Werner points out that modern English-language textbooks on "Development Economics" suggest that the discipline emerged as a result of decolonization and is now taught in universities. These books highlight that "Development Economics" as a field only came into existence in the 1950s and 1960s, driven by the rise of newly independent nations. However, Werner emphasizes that this academic

[82] Richard D. Werner, "Washington's 'Development Economics' Is Actually Designed to Prevent Development," 2023, https://professorwerner.org/blog/.

discipline was not developed by the intellectuals of these newly independent nations. Instead, it was shaped by British and American economists. This, according to Werner, exposes the real agenda behind "Development Economics." If the goal of this field had truly been to guide nations in achieving rapid development and transitioning from developing to developed status, it would have been formulated much earlier, during the colonial period itself. The colonial powers, having control over these nations, would have had the ideal opportunity to implement the policies necessary for economic growth while the countries were under their rule.[83]

A clear measure of success in economic policies is the outcomes they produce. After 75 years of international development policies supported by the IMF and World Bank, no country among the more than 100 developing nations has successfully transitioned to developed status through these institutions' guidance. Historically, economic powers did not rise through free trade and market policies, but by adopting selective trade practices and protecting emerging industries to build robust domestic sectors. The failure of IMF and World Bank policies is not just coincidental; some argue that these policies were intentionally designed to prevent real economic development. Instead, they keep developing nations dependent, focusing on low-value commodity exports under the notion of "comparative advantage." Over time, this leads to declining export prices, balance of payments deficits, and weakening currencies, forcing these nations into debt traps while making their resources cheaper for wealthier countries.[84]

While some countries—like Japan, South Korea, Singapore, and China (including Taiwan)—have successfully moved to developed status, they did so by rejecting IMF and World Bank-style "Development Economics." These nations implemented policies like protecting emerging industries, crafting industrial policies, and relying on domestic credit rather than foreign loans, which are expressly discouraged by the IMF. China's example is especially noteworthy, as it has lifted more people out of poverty than any other country in history by defying the Washington Consensus model.[85]

Michel Chossudovsky, a Canadian economist and professor emeritus of economics at the University of Ottawa, argues

[83] Ibid.
[84] Ibid.
[85] Ibid.

that policies associated with globalization, including structural adjustments, deregulation, privatization, and the liberalization of trade, disproportionately favored the privileged elite and corporations, thereby deepening the chasm of inequality and poverty. According to Chossudovsky the concept of the "New World Order," symbolizing the global supremacy of certain nations and corporations, epitomizes this economic and political domination, often resulting in the exploitation of resources and labor within less developed regions.[86]

Furthermore, Chossudovsky elucidates that the model of Western-style globalization perpetuates resource and labor exploitation in developing countries, perpetuating the wealth gap through mechanisms like debt and market-driven strategies that corrode national sovereignty.[87] International financial institutions, exemplified by the IMF and World Bank, impose austerity measures and structural reforms as prerequisites for aid, exacerbating economic hardship and destitution. Multinational corporations wield significant influence, prioritizing their interests at the expense of local communities and sustainable development. Geopolitically, dominant nations manipulate worldwide economic policies to align with their individual agendas.[88] The Advisory Commission for International Financial Institutions (also known as the Meltzer Commission) stated that the IMF holds excessive influence over the economic policies of developing nations and that G7 governments utilize the IMF to further their own political objectives.[89]

Regarding military dominance, the USA aims to uphold its position as an unmatched global power. In his work "Base Nation," David Vine, a Professor of political anthropology at American University, explores worldwide presence of American military bases, numbering around 800 across 80 countries, from Italy to the Indian Ocean, highlighting the risks associated with these international bases.[90] Despite over two decades since the Cold War, the U.S. still stations troops in around a thousand foreign locations. Often overlooked, these

[86] Michel Chossudovsky, *The Globalization of Poverty and the New World Order* (Batu Caves Selangor: Thinker's Library Sdn Bhd, 2007).

[87] Ibid.

[88] Ibid.

[89] Graham Bird and Paul Mosley, "The Role of the IMF in Developing Countries," in *The IMF and Its Critics: Reform of Global Financial Architecture*, ed. David Vines and Christopher L. Gilbert (Cambridge: Cambridge University Press, 2005), 288–315.

[90] David Vine, *Base Nation: How U.S. Military Bases Abroad Harm America and the World* (New York: Skyhorse Publishing, 2015).

bases form a significant part of the Pentagon's extensive operations. Yet, "Base Nation" demonstrates that this expansive base network contributes to various challenges, ultimately jeopardizing the long-term national security of other nations.

In his recent book, "The United States of War," David Vine traces the historical trajectory of U.S. imperial dominance from Columbus's arrival in 1494 at Guantánamo Bay through 250 years of global expansion.[91] Drawing from historical and firsthand anthropological research in fourteen regions, Vine reveals how the U.S. has created an extensive network of foreign military bases, fueling a cycle of perpetual war. This matrix increases the likelihood of offensive interventions. Vine uncovers the underlying motives of profit, politics, racism, and toxic masculinity that drive America's war-oriented relationship. He showcases how this prolonged military expansion affects daily life, from multi-trillion-dollar conflicts to pervasive violence in society.

In the latter part of the book, Vine proposes solutions to address the catastrophic toll of American wars, advocating for an end to taxpayer-funded wars and efforts to repair the damage inflicted globally. He suggests embracing democratic rights, justice, global equity, reconciliation with past conflicts, and healing as better foundations for U.S. foreign policy and international engagement than a perpetual state of war.

The author contends that if Bernard Lewis were alive today, he would not have endorsed the solution proposed by David Vine. While acknowledged as an authority on Islam, Lewis lacks credibility as a proponent of peace due to his historical stance. Specifically, Lewis played a pivotal role in advocating for the Iraq invasion,[92] misleadingly attributing the Arab world's backwardness to false premises. Notably, he originated the concept of the "*clash of civilizations*," a term later popularized by Samuel Huntington. In his work "What Went Wrong?" published in The Atlantic and as a book, Lewis failed to address the impact of Western imperialism in shaping current economic, political, and military dynamics, resulting in underdevelopment and stagnation in third-world nations including Muslim worlds. The author posits that this omission stems from Lewis's alignment with imperialist

[91] David Vine, *The United States of War: A Global History of America's Endless Conflicts from Columbus to the Islamic State* (Oakland California: University of California Press, 2020).

[92] Brian Whitaker, "Bush's Historian," *The Guardian*, 2006, https://www.theguardian.com/commentisfree/2006/may/02/thehistoryman.

agendas. In line with David Vine's terminology, it's conceivable that Lewis would not favor a "United States of Peace" but rather a "United States of War."

Conclusion

In conclusion, this study has examined the decline of science in the Islamic world by scrutinizing three prominent theories advanced by both liberal Muslim and Western scholars, which encompass internal and external factors. The first theory, which misrepresented al-Ghazālī's position in his *Tahāfut al-Falāsifa*, has been debunked; al-Ghazālī was indeed a proponent of scientific inquiry, and scientific progress continued well beyond his era. The second theory, which attributed the decline to the Mongol invasion of Baghdad in 1258, is contradicted by the flourishing of the Maragha Observatory, a center for mathematics and astronomy. Similarly, the third theory, which linked the decline to the Ottoman press bans under Sultan Bayezid II (1485) and Selim I (1515), has been dismissed; the Ottomans temporarily restricted the use of the press for specific circles due to political and economic concerns, not due to any inherent aversion to knowledge dissemination.

By applying Janet Abu-Lughod's adaptation of Immanuel Wallerstein's world-system theory, this study asserts that the decline of scientific tradition in the Islamic world cannot be fully understood without considering the overarching influence of Western hegemony. Western dominance, which permeated the political, economic, and intellectual landscapes of third-world nations, particularly after World War II, played a significant role in shaping the conditions that stifled scientific and intellectual growth in the Islamic world. The geopolitical reordering that followed the war, marked by the emergence of the United States and the Soviet Union as superpowers, saw the West—especially the U.S.—establishing a new world order that reinforced its global dominance while managing the political and economic structures of developing nations. Institutions like the World Bank and IMF were pivotal in this process, offering financial aid and economic guidance under the guise of fostering development. However, their policies frequently aligned with Western interests, imposing conditions that limited the sovereignty and self-determination of the countries they were purportedly aiding. These economic frameworks often led

to dependency rather than genuine development, stifling the potential of these nations to chart independent paths to progress.

Moreover, the development economics promoted by these Western institutions, and disseminated globally through various educational programs, were designed in ways that maintained this imbalance. These curricula privileged Western economic models and ideologies that did not align with the cultural, social, and historical realities of the developing nations they were imposed upon. This perpetuated a cycle of dependency, inhibiting innovative, localized solutions that could spur authentic progress. The promotion of Western ideologies, such as liberal democracy and free-market capitalism, further exacerbated these issues. These ideologies were often incompatible with the unique historical and cultural contexts of many Islamic countries, creating social and political tensions that hindered progress. The enduring effects of colonialism, coupled with the imposition of Western models of governance and economics, contributed to the structural challenges that have hampered scientific and intellectual development in the Islamic world.

Additionally, many of the critiques aimed at Islam by Western scholars can be traced to an ingrained sense of Western superiority. This superiority complex, which underpinned the era of Western colonialism, positioned the West as the pinnacle of civilization, while other nations were viewed as backward and in need of "civilization." This mentality contributed to a distorted historical narrative, one in which the West claimed sole credit for the achievements of the Renaissance, ignoring the critical role that Muslim scholars played in its intellectual foundations. The Renaissance, far from being a purely Western phenomenon, was significantly influenced by the works of Muslim scholars. Through the translation of Arabic texts, the study of Arabic sciences, and the acquisition of Muslim books, Western intellectuals were able to build on the scientific and philosophical advancements of the Islamic world. These contributions were instrumental in shaping the European intellectual revival, yet they are frequently overlooked in favor of a Eurocentric narrative that marginalizes the Islamic world's impact on global scientific development.

Thus, the study concludes that the decline of the scientific tradition in the Islamic world cannot be understood in isolation from the broader patterns of Western hegemony, colonial exploitation,

and the socio-political transformations that followed the Western Renaissance. After this period, the West asserted intellectual, political, and economic dominance globally, marginalizing other civilizations, including the Islamic world. The Renaissance, often celebrated as a purely Western achievement, was in fact built upon centuries of Islamic scientific and philosophical contributions. Yet, following the Renaissance, the West not only overshadowed these contributions but also actively imposed structures of colonial and intellectual subjugation that stifled the Islamic world's own scientific progression. The Islamic world's historical trajectory, particularly in the realm of scientific inquiry, became deeply intertwined with the forces of Western dominance. This included the exploitation of Islamic regions during the colonial era and the lingering impacts of post-colonial economic dependence. These external pressures, combined with the imposition of Western models of governance and development, contributed to the erosion of the once-thriving scientific traditions within the Islamic world, leading to a prolonged period of stagnation and intellectual marginalization.

References

Abu-Lughod, Janet. *Before European Hegemony: The World System A.D. 1250-1350*. New York: Oxford University Press, 1991.

Acemoglu, Daron, and James A. Robinson. *Why Nations Fail: The Origins of Power Prosperity and Poverty*. New York: Crown Business, 2012.

Al-Ghazālī. *The Incoherence of the Philosophers: A Parallel English-Arabic Text*. Translated by Michael E. Marmura. Provo, Utah: Brigham Young University Press, 1997.

———. *The Savior from Error (al-Munqidh Min al-ḍalāl)*. Translated by Muhtar Holland. Florida: Al-Baz Publishing Inc, 2010.

Al-Khalili, Jim. *Pathfinders: The Golden Age of Arabic Science*. London: Penguin, 2010.

Al-Khalili, Jim. *The House of Wisdom: How Arabic Science Saved Ancient Knowledge and Gave Us the Renaissance*. New York: Penguin Books, 2014.

At-Tirmidhī. *English Translation of Jami At-Tirmidhi (Al-Jami' al-Mukhtaṣ ar Min as-Sunan 'an Rasūl Allāh)*. Translated by Abu Khaliyl. Riyadh: Darussalam, 2007.

Bentley, Jerry H., Renate Bridenthal, and Kären Wigen. *Seascapes: Maritime Histories, Littoral Cultures, and Transoceanic Exchanges*. Hawai: University of Hawai◉i Press, 2007.

Bevilacqua, Alexander. *The Republic of Arabic Letters: Islam and the European Enlightenment*. Cambridge, MA; London, England: Belknap Press of Harvard University Press, 2018.

Bird, Graham, and Paul Mosley. "The Role of the IMF in Developing Countries." In *The IMF and Its Critics: Reform of Global Financial Architecture*, edited by David Vines and Christopher L. Gilbert, 288–315. Cambridge: Cambridge University Press, 2005.

Chossudovsky, Michel. *The Globalization of Poverty and the New World Order*. Batu Caves Selangor: Thinker's Library Sdn Bhd, 2007.

Darke, Diana. *The Ottomans: A Cultural Legacy*. London: Thames & Hudson, 2022.

Edis, Taner. *An Illusion of Harmony: Science And Religion in Islam*. Amherst, N.Y: Prometheus, 2007.

Faris, Nabih Amin. *Al-Ghazzali in The Arab Heritage*. Edited by N. A. Faris. Princeton: Princeton University Press, 1994.

Gingerich, Owen. *The Book Nobody Read: Chasing the Revolutions of Nicolaus Copernicus*. New York: Penguin Books, 2005.

Griffel, Frank. *Al-Ghazālī's Philosophical Theology*. Oxford: Oxford University Press, 2009.

———. "The Western Reception of Al-Ghazālī's Cosmology from the Middle Ages to the 21st Century." *Dîvân: Disiplinlerarası Çalışmalar Dergisi* 16, no. 3 (2011): 33–62.

Hartner, Willy. "Copernicus, the Man, the Work, and Its History." *Proceedings of the American Philosophical Society* 117, no. 6 (1973): 413–22. http://www.jstor.org/stable/986460.

Hegel, Georg Wilhelm Friedrich. *Lectures on the History of Philosophy. The Lectures of 1825-26 Volume III: Medieval and Modern Philosophy*. California: University of California Press, 1990.

Hidayat, Komaruddin. "Islam, Science and Religion." Universitas Islam Internasional Indonesia, n.d. Islam, Science and Religion," Indonesian Internationahttps://uiii.ac.id/rector/speech/1614782716/islam_science_and_religion.

Hirsi Ali, Ayaan. *Heretic: Why Islam Needs a Reformation Now*. New York: Harper, 2015.

Howes, Anton. "Did the Ottomans Ban Print?" *Age of Invention*, 2021. https://www.ageofinvention.xyz/p/age-of-invention-did-the-ottomans.

Ibid. *Ibid.*, n.d.

Iqbal, Mohammad. "The Impact of Mongol Invasion on the Muslim World and the Political, Economic and Social Ramifications." *Social Science Research Network (SSRN)*, 2021. http://dx.doi.org/10.2139/ssrn.3899594.

Jamil Ragep, F. "Al-Ghazālī and Science" in Al-Ghazālī, An Exhibition Held in the Humanities & Social Science Library." In *Al-Ghazālī and Science*, edited by Sean Swanick. Montreal Quebec: McGill University Library, 2011.

Jean-Paul, Rodrigue. *The Geography of Transport Systems*. London: Routledge, 2020.

Kennedy, E.S. "Late Medieval Planetary Theory." *The University of Chicago Press* 57, no. 3 (1966). https://doi.org/10.1086/350144.

Lewis, Bernard. "What Went Wrong?" *The Atlantic*, 2022. https://www.theatlantic.com/magazine/archive/2002/01/what-went-wrong/302387.

Naseem Rafiabadi, Hamid. *Emerging from Darkness: Ghazzali's Impact on the Western Philosophers*. New Delhi: Sarup & Sons, 2002.

Nosonovsky, Michael. "Abner of Burgos: The Missing Link between Naṣīr al-Dīn al-Ṭūsī and Nicolaus Copernicus?" *Zutot* 15, no. 1 (2018): 25–30. https://doi.org/doi: https://doi.org/10.1163/18750214-12151070.

Pierre, Belon, and Alexandra Merle. *Voyage Au Levant (1553): Les Observations De Pierre Belon Du Mans De Plusieurs Singularités & Choses Mémorables*. Paris: Éd. Chandeigne, 2021.

Rasjidi, H.M. *Koreksi Rasjidi Terhadap Harun Nasution Dalam Uraiannya: Ajaran Islam Tentang Akal Dan Akhlak*. Jakarta: Media Dakwah, 1985.

Said, Yazid. "Yazid Said, Abū Ḥa◎ Mid al-Ghazālī◎s Legacy in Al-Ghazālī, An Exhibition Held in the Humanities & Social Sciences Libray." In *Al-Ghazālī*. Montreal Quebec: McGill University, 2011.

Saliba, George. "Arabic Planetary Theories after the Eleventh Century AD." In *Encyclopedia of the History of Arabic Science. Volume 1 Astronomy - Theoretical and Applied*, edited by Rushdī Rāshid and Régis Morelon, 58–127. London: Routledge, 1996.

———. *Islamic Science and the Making of the European Renaissance*. Massachusetts: MIT Press, 2007.

———. *Whose Science Is Arabic Science in Renaissance Europe?* (Columbia: Columbia University, 1999.

Sobel, Dava. *A More Perfect Heaven: How Copernicus Revolutionized the Cosmos*. New York: Walker & Company, 2012.

Steinberg, Philip E. *The Social Construction of the Ocean*. Cambridge: Cambridge University Press, 2001.

Swerdlow, N. M., Herman H. Goldstine, and O. Neugebauer. *Mathematical Astronomy in Copernicus's De Revolutionibus*. New York: Springer-Verlag, 1984.

Thevet, André. "Les Vrais Pourtraits et Vies Des Hommes Illustres Grecz, Latins et Payens: Recueilliz de Leurs Tableaux, Livres, Médalles Antiques et Modernes." par la Vesve, 1584. https://gallica.bnf.fr/ark:/12148/btv1b86246591/f1139.vertical#.

Vernon O. Egger. *A History of the Muslim World to 1750: The Making of a Civilization*. Routledge, 2018.

Vine, David. *Base Nation: How U.S. Military Bases Abroad Harm America and the World*. New York: Skyhorse Publishing, 2015.

———. *The United States of War: A Global History of America's Endless Conflicts from Columbus to the Islamic State*. Oakland California: University of California Press, 2020.

Wallerstein, Immanuel Maurice. *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. New York: Academic Press Inc, 1974.

Warraq, Ibn. *Why I Am Not a Muslim*. Amherst, N.Y: Prometheus, 2003.

Werner, Richard D. "Washington's 'Development Economics' Is Actually Designed to Prevent Development." ..Org, 2023. https://professorwerner.org/blog/.

Whitaker, Brian. "Bush's Historian." *The Guardian*, 2006. https://www.theguardian.com/commentisfree/2006/may/02/thehistoryman.

Zuhri, H, and Muhammad Arif. "Al-Ghazalī (1058-1111) In The Eyes of Contemporary Indonesian Muslim Intellectuals." *Hamdard Islamicus* 46, no. 1 (2023). https://doi.org/doi.org/10.57144/hi.v46i1.512.