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NATURAL SCIENCES IN THE ERA OF ‘DECLINE’: DISCOVERING MANUSCRIPTS AT JĀMI’ AL-AZHAR

Muhammad Faris Ibrahim*

Abstract: This article critically examines the commonly held narrative of decline, in relation to the development of natural sciences in Islamic history. The period between the 16th and 19th centuries CE is often referred to as a time of decline for Islamic civilisation. Conversely, this period is also considered an important time for the European Renaissance and its modern age, including in terms of natural sciences. In this article, I argue that, while attempts to periodise Islamic history can facilitate better understanding of historical developments, they are often significantly influenced by underlying biases aimed at exerting dominance over the Muslim world. I have found the narrative of decline is closely connected to the linear movement theory of history. Furthermore, Egyptian modernists used the decline narrative to criticise al-Azhar without acknowledging its scholars’ support for progress. Lastly, the narrative of decline built by modernists against al-Azhar for not paying attention to the natural sciences needs to be critically reviewed, particularly by referring to manuscripts written by al-Azhar scholars related to natural sciences, such as medicine, algebra, astronomy and engineering from the 16th to 19th centuries as a counter-narrative of decline.

Keywords: *Natural sciences, decline, Jāmi’ al-Azhar, Egypt, Islamic intellectual history*

INTRODUCTION

In the 18th century, Ottoman Turkey entered a period marked by stagnation, during which Egypt, under Ottoman rule, successfully maintained its cultural and political distinctiveness. The weakened authority of the Ottoman administration, coupled with internal rivalries among various Mamluk factions, precipitated a multifaceted crisis in Egypt. Recognising an advantageous opportunity amid the prevailing challenges, Napoleon Bonaparte initiated an

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invasion of Egypt in 1798.¹ The ensuing colonial endeavours of the West, stemming from this incursion, extended beyond mere resource extraction, land acquisition for trade or the use of inexpensive labour. Rather, they were strategically designed to perpetuate continuous Western influence over the colonies. In pursuit of this agenda, Napoleon introduced the printing press as a means to disseminate and promote modernism.

Modernism, an extension of the Renaissance, manifests in the exaltation of science.² This phenomenon reflects the historical trauma of European society, where the church monopolised all branches of science, including those related to natural sciences.³ In the annals of Islamic society, there was a distinct absence of conflict between religion and science. On the contrary, it was commonplace to encounter scholars (*ulama*) who concurrently engaged in scientific pursuits. One of the interesting findings on this matter is what was written by ‘Iwād al-Khalīf and Qāsim Alī Sa’īd. They discovered there were approximately 1,066 Muslim scholars who were experts in religious sciences (*ulūm shar’iyya*) and empirical sciences (*ulūm tajrībiyya*). This discovery is based on references from only 13 biographical books of scholars (*tarājīm al-ulamā*).⁴ Therefore, when Napoleon arrived in Egypt with a cadre of experts across scientific disciplines, ostensibly to enlighten what he perceived as ‘bad Muslims,’⁵ it resembled teaching birds how to fly.

Napoleon constructed a narrative of decline to maintain his political control and this endeavour proved effective. Following his departure from Egypt, Muhammad Alī, who subsequently was appointed as the Ottoman Turks’ governor in 1805, spearheaded extensive modernisation, particularly in education. This initiative materialised through the dispatch of Egyptian students to study in Italy, France, England and Austria from 1823 to 1844, totalling approximately 311 students.⁶ The objective was to cultivate educators capable of incorporating what is considered modern sciences in Egypt.

Eventually, attempts to modernise education faced obstacles from Jāmi’ al-Azhar. In the 1870s, the acceptance of the European educational model was characterised by a semblance of clerical conservatism, positioned as an opposing force to the progress championed by modernists.⁷ Similar to Napoleon’s strategy, key reformist figures, such as Rifā’ah Rāfi’ al-Tahthāwī, Jamāl al-Dīn al-Afghānī and Muhammad Abduh, played a pivotal role in constructing a narrative of decline. This narrative portrayed al-Azhar and its scholars as

¹ Philip K. Hitti, *History of the Arabs*, 10th ed. (London: Higher and Further Education Division Macmillan Publisher Ltd, 1984), 721.

² Mahmoud Reza Ghorban Sabbagh, “Examining the Relationship between ‘Science’ and ‘Religion’ in the Socio-Cultural Context of the Renaissance: A Kuhnian Reading of Bacon’s New Atlantis,” *International Journal of Society, Culture & Language*, 2020, 60–69.

³ Ibid.

⁴ Iwād al-Khalīf and Qāsim Alī Sa’īd, *Al-Jāmi’ūn Bayna l-Ulūm l-Shar’iyya Wa l-Ulūm al-Tajrībiyya* [The Integrators of Sharia Sciences and Empirical Sciences] (Dubai: Jāiza Dubay al-Dawliyya li l-Qur’ān al-Karīm, 2015), 14.

⁵ Hitti, *History of the Arabs*.

⁶ Noha Mostafa, “The Modernization of Egypt in the Nineteenth Century: A Comparison with the Japanese Case,” *Titech Studies in Science, Technology and Culture* 18 (2015).

⁷ Indira Falk Gesink, *Islamic Reform and Conservatism: Al-Azhar and the Evolution of Modern Sunni Islam* (I.B. Tauris, 2010), 59, <https://doi.org/10.5040/9780755623891>.

conservative, with one of the accusations being their purported neglect of the natural sciences in its curriculum.

This narrative faced a counterargument. Notably, certain individuals who self-identified as *al-muḥāfizun* (conservatives) opposed the modernists who sought educational reform at al-Azhar. The critique, however, does not portray al-Azhar as inherently anti-progress, particularly in the realm of teaching natural sciences. I perceive the resistance was more centred on technical concerns and issues rather than ideological matters. The issuance of the Science Fatwa in 1888 by Shaykh al-Azhar al-Inābī and Mufti Muhammad al-Bannā⁸ serves as clear evidence that al-Azhar is not opposed to scientific advancements.

Moreover, a valuable endeavour would involve reviewing manuscripts – primary resources of this article – in the Jāmi' al-Azhar library, which spans more than a millennium⁹ and contains over 15,000 manuscripts.¹⁰ Focusing on the 18th century could offer a counter-narrative to the 19th century depiction of decline in scientific pursuits. On examination, it becomes evident that numerous al-Azhar scholars in the 18th century demonstrated interest and engagement in natural sciences, including medicine, algebra, engineering and astronomy. This serves as compelling evidence that the narrative of decline, particularly in the realm of natural sciences, is not entirely accurate.

Eventually, this study employs a historical approach, focusing on the history of natural science. It adopts a qualitative research design, in line with Straus and Corbin's assertion that qualitative methods suit historical exploration.¹¹ The methodology involves a descriptive-analytical literature review, encompassing the description, explanation and analysis of detailed data obtained by me. As briefly mentioned earlier, primary data is sourced from manuscripts on natural sciences in the Jāmi' al-Azhar library, digitally preserved by the Tsāqifat al-Safā al-Ilmiyah Institute. Secondary data is gathered from journals, books and other scientific studies.

Additionally, I integrate the theory of the cyclical movement of history, as proposed by prominent Muslim thinker Ibn Khaldūn (d. 1406). This theory posits that cultures or civilisations undergo circular movements of rise and fall, resulting in diverse circular motions around the Earth.¹² Contrary to a linear movement, this cyclical theory supports my argument concerning a parallel golden age between Islamic and European civilisations in the 16th to 19th centuries. This perspective further reinforces my claim about advancements in natural sciences preceding Egypt's encounter with modernism in the 19th century.

⁸ Ibid., 117.

⁹ Tsāqifat al-Safā al-Ilmiyyah, "Electronic Library of Jāmi' Al- Azhar" (Masyikhah al- Azhar: Maktabah Syāmilah, 2013), 10.

¹⁰ Ibid., 12.

¹¹ Anseirn Straus and Juliet Corbin, *Basics of Qualitative Research: Grounded Theory Procedures and Techniques* (Newbury Park, CA: Sage, 1995).

¹² Murat Önder and Fatih Ulaşan, "Ibn Khaldun's Cyclical Theory on the Rise and Fall of Sovereign Powers: The Case of the Ottoman Empire," *Adam Academy Journal of Social Sciences* 8, no. 2 (2018), <https://doi.org/10.31679/adamakademi.453944>.

DECLINE PARADIGM REVISITED

The challenge to the neutrality of science has been articulated by numerous scholars who argue that science is inherently bound by its underlying values. Seyyed Hossein Nasr expresses apprehension regarding modern secular science, which tends to dismiss anything beyond empirical evidence as myth and superstition.¹³ Additionally, Syed Muhammad Naquib al-Attas posits that West-developed science has led to unprecedented chaos, with animals, plants and metals facing significant challenges. Similarly, in the field of historical science, as noted by LeGoff, Recep Şentürk outlines the evolving trends in historical writing, highlighting that the determination of specific historical periods is never a neutral endeavour.¹⁴ Particularly in identifying periods of decline, there exists a distinct Western bias against the Muslim world. This section elucidates the theoretical foundations of the decline narrative, subsequently delving into the challenges inherent in interpreting history and the associated biases of interest.

This narrative of decline can be identified from the theory of historical movement patterns, which, in turn, shapes the perspective of categorising history into distinct periods. Two predominant views regarding historical movement patterns are the linear theory, advocating a straightforward progression, and the cyclical theory. Advocates of the linear pattern, influenced significantly by the European Enlightenment in the 15th to 17th centuries, believe in continuous forward movement in history, leaving behind previous stages for higher ones, with progress as the central theme. Reformers and scientific pioneers like Francis Bacon, Descartes, Machiavelli, Hobbes and John Locke emphasised the innate human nature of seeking progress and liberation from past constraints. This optimistic view of historical changes characterises the linear pattern of historical motion.¹⁵

As for those adhering to a cyclical view of history, it signifies a perspective where historical progression occurs in cycles, with alternating periods of advancement and regression. No civilisation perpetually advances or declines; each undergoes its turn over time. This theory aligns closely with the intellectual tradition in Eastern societies, which holds great reverence for religious teachings and traditions. Ibn Khaldūn, transitioning from focusing solely on the history of the *ulama*, expanded his historical development to encompass the state, viewing history as cyclical, akin to the lifespan of a living organism.¹⁶ Similarly, Spengler posited that culture experiences cycles akin to the biological processes of a living organism.¹⁷ Modern historians like Arnold Toynbee, in his seminal work *A Study of History*, contend that

¹³ Seyyed Hossein Nasr, *Knowledge and the Sacred* (New York: Crossroad, 1989), 33.

¹⁴ Recep Şentürk, "The Decline of the Decline Paradigm: Revisiting the Periodisation of Islamic History," in *Niedergangsthesen Auf Dem Prüfstand/Narratives of Decline Revisited*, ed. Bacem Dziri and Merdan Güneş, Reihe für Osnabrücker Islamstudien, vol. 38 (Berlin: Peter Lang, 2020), 216, <https://doi.org/10.3726/b17739>.

¹⁵ Mohammad Maiwan, "Cosmology of History in the Philosophy of History: Schools of Thought, Theories, and their Developments," *Indonesian Journal of Humanities* 3, no. 2 (2013): 167.

¹⁶ Önder and Ulaşan, "Ibn Khaldun's Cyclical Theory"; Maiwan, "Cosmology of History," 168.

¹⁷ Abdurrahman Badawi, *Mausūah Al-Falsafah*, vol. 2 (Beirut: Muassasah Arabiyyah liddirasat wan nasyr, 1984), 34.

civilisations emerge in response to challenges, asserting that no civilisation maintains perpetual advancement or retreat; instead, decline and destruction are inherent and recurrent elements.¹⁸

Furthermore, this article argues that the fundamental distinction between the two lies in the interpretation of history. The cyclical theory perceives each civilisation, country and society as undergoing distinct historical periods, where progress and decline follow uncertain trajectories, with their alternation being commonplace. This contrasts with the linear movement, which envisions human historical progression as unidirectional from inception to culmination, occasionally necessitating setbacks for advancement. Decline factors are numerous, contingent on determinants, and often involve subjective generalisations about something or someone. This introduces the concept of decline as a paradigm, implying its biased emergence due to the interplay between science and power in historical contexts.

In the subsequent sections, this article will delve into the repercussions, biases and assessments associated with the decline narrative. As noted by Şentürk, the duality of historical periods in terms of progress and decline yields at least five adverse consequences: first, the broad categorisation of development and decline results in sweeping judgements, obscuring scholars from a nuanced understanding of actual events. Second, it compels researchers to interpret evidence in alignment with predetermined dichotomies. Third, the use of terms like progress and decline implies subjective value judgements rather than objective assessments of what and who. Fourth, it reflects ideological biases, encompassing euro-centrism, racism, nationalism, puritanism or religious fanaticism. Last, it involves imposing a specific periodisation of history on others while disregarding their historical perspectives.¹⁹

Moreover, bias is evident, particularly in the delineation of periods in Islamic history, marking the era preceding al-Ghazālī (d. 1111) as the golden age of Islamic science and the subsequent period as one of decline. Orientalists built their thesis on the premise that the first 500 years of Islam constituted a productive period, where Greek philosophy was translated into the Muslim world, fostering the emergence of luminaries like Ibn Sīnā in medicine, al-Khawārizmī in mathematics and al-Biruni in biology. However, al-Ghazālī's efforts aimed at reinstating the superiority of revelation over reason challenged this perspective. Various scholars have contested this view, with George Saliba, in his work, *Islamic Science and the Making of the European Renaissance*, refuting the assumption that Greek tradition fuelled the rise of Islamic science. According to Saliba, Islamic science predates the translation movement and the translations underwent a process of de-Hellenisation, making the Greek tradition more aligned with Islamic principles. Al-Ghazālī advocated for the study of mathematics, albeit without elevating it to the sole determinant of all knowledge.²⁰

The process of de-Hellenisation referenced by Saliba can also be observed in how Islamic scholars not only translated but also refuted theories developed by Greek scientists. For example, in the field of optics, the revolutionary ideas of Ibn al-Haitham, in his book *al-*

¹⁸ Mufid al-Zaidī, *Madkhal Ilā Falsafat Al-Tārikh* [An Introduction to the Philosophy of History] (Amman: Darul Manahij, 2006), 118–19.

¹⁹ Şentürk, “The Decline of the Decline Paradigm,” 214.

²⁰ Abū Hāmid al-Ghazālī, *Ihyā' Ulūm al-Dīn* [Renewal of Religious Sciences], vol. 1 (Darul Hadits, n.d.), 36.

Manāẓīr, challenged the notions of Greek scientists such as Euclid, Heron, Archimedes, Ptolemy and Theon regarding vision. Ibn al-Haitham's work laid the foundation for the modern understanding of optics and visual perception. He criticised Greek beliefs by asserting that the eye does not emit light for vision, contrary to the views of previous Greek scientists. Instead, he argued that light must enter the eye for visual perception, explaining that darkness would prevent vision if the eye emitted light. Hence, the eye requires external light sources for visibility. Furthermore, he noted that looking at bright light sources causes dazzlement, further refuting the idea that the eye emits light. Ibn al-Haitham's contributions extended beyond optics; he established the foundations of the empirical approach that influenced Western scientists in the 17th century, such as Newton, Galileo, Roger Bacon and Kepler, in their various discoveries.²¹

Moreover, the issue extends beyond the assertion that natural sciences in Islamic civilisation declined after Ghazālī. Syed Hossein Nasr highlights the presence of over 3,000 unstudied medical manuscripts in India and Yemen.²² Dimitri Gutas notes that scientific contributions during the Ottoman period remain largely unexplored.²³ Muzaffar Iqbal adds weight to the problem, indicating that, in Iran, around 200,000 manuscripts exist, with three-quarters remaining uncatalogued.²⁴ This substantiates the argument that the decline narrative paradigm obstructs researchers from engaging with on-the-ground data, ensnaring them in the narrative of decline.

Orientalists, particularly those from the far right, harbour a keen interest in discrediting al-Ghazālī, considering him a pivotal figure in Islam with extraordinary influence. It is nearly impossible to encounter a mosque without finding his book, *Ihyā' Ulūm al-dīn*, on its bookshelf alongside copies of the Qur'ān. Moreover, al-Ghazālī played a crucial role in shaping a scientific framework aligned with Islam, challenging the Western scientific concept that elevates reason and the five senses. His divergence from the certainty of causality, emphasising God as the primary cause of science,²⁵ stands in direct opposition to Western scientific ideals. It is in this context that attempts to label the post-Ghazālī period as one of decline reveal inherent biases. Eventually, the contested periodisation of Islamic history has prompted reassessment among historians. Details are provided in the next section.

²¹ Nedim Unal and Omur Sayligil, "Anatomy of the Eye from the View of Ibn Al-Haitham (965-1039). The Founder of Modern Optics," *Saudi Medical Journal* 30 (2009).

²² In his lecture on "Islam and Modern Science" delivered at MIT, Cambridge, MA, 1997. Macksood Aftab, "Ghazali, Islamophobia and the Myth of Islamic Decline," *Muslim Philosophy*, n.d., 4, <https://www.muslimphilosophy.com/aftab/wp-content/uploads/2013/12/The-Myth-of-Islamic-Decline.pdf>.

²³ Dimitri Gutas, *Greek Thought, Arabic Culture: The Graeco-Arabic Translation Movement in Baghdad and Early Abbasid Society* (New York: Routledge, 1998), 175.

²⁴ Muzaffar Iqbal, *The Making of Islamic Science* (Malaysia: Islamic Book Trust, 2009), 145–46.

²⁵ Hamid Fahmy Zarkasyi, "Epistemological Implication of Al-Ghazzālī's Account of Causality," *Intellectual Discourse* 26 (2018): 52.

GOLDEN AGE OF ISLAM AND EUROPE: SIMULTANEOUS ERA

The departure from a binary view of decline and progress is significant and can be shaped by recognising the possibility of concurrent renaissances or golden ages. This was evident in the period between the 16th and 19th centuries, when Islam and Europe experienced transformative epochs. Challenging the tendency to exclusively highlight the West in historical narratives, an overemphasis on the 16th century, marked by Martin Luther's religious reformation in 1517, as the singular start of the Renaissance and conclusion of the Middle Ages,²⁶ commonly referred to as humanity's dark ages, contributes to this nuanced perspective.

Consequently, Malek Bennabi highlighted an anomaly in the historical perspective that cast the West as the central figure. A common trend among Western historians in the 19th to 20th centuries perceived human history as having initiated in Greece and Rome, experienced a hiatus or stagnation, and later re-emerged in Paris and London.²⁷ This perspective overlooked the contributions of Islamic civilisation, dismissing the period labelled as stagnant as a golden age for Islamic civilisation. This historiographical model was similarly applied to the interpretation of the 16th to 19th centuries, where the significance of Islamic intellectuals appeared diminished as the Western ascended.

Subsequently, the correction of Western subjectivity in historical interpretation has been initiated by scholars such as Marshall Hodgson. He criticised the tendency to exclusively consider Arab culture as the sole representation for understanding Islamic history. Thus, to challenge the conventional belief that Islamic civilisation experienced a prolonged decline after the 10th century until its revival through modernisation and Western influence in the 19th century, Hodgson advocated for a more nuanced approach. He emphasised the significant roles played by the Persians and Turks as integral parts of Islamic civilisation, who also contributed to shaping a cosmopolitan Islamic culture after the 10th century.²⁸ In this regard, Hodgson seemed to assert that Islam was not only Arab, and the decline of the Arabs did not necessarily imply the decline of the Turks and Persians, who were also part of Islamic civilisation.

Contrary to the prevailing perspective, that after the 10th century Islamic civilisation entered an era of decline, Hodgson extended the golden era of Islamic civilisation from the 10th to the 16th century, attributing its decline to military factors, particularly colonialism in the early 19th century. This upheaval led to the demise of the Safawī kingdom in Iran, the Timurid Empire in India and the Ottoman Empire. By characterising the 16th century as a decline rather than a pinnacle, Hodgson's viewpoint positions the 17th century as the commencement of this decline, sparking further enquiry by Khaled al-Rouyheb.²⁹ This nuanced understanding prompted

²⁶ Mahmūd Hamdī Zaqqūq, *Dirāsāt Fī Al-Falsafah Hadītsah* [Studies in Modern Philosophy], 2nd ed. (Cairo: Dār al-Ṭibā'at al-Muḥammadiyyah, 1998), 16.

²⁷ Badrān Benalhasan, *Al-Khoshāis al-Amah Li al-Hadhārah al-Gharbiyyah Inda Mālek Bennabī* [The General Characteristics of Western Civilization According to Malek Bennabi] (al-Jāmi'ah al-Ālamiyyah Māliziyya, 1998), 67.

²⁸ Şentürk, "The Decline of the Decline Paradigm," 229–30.

²⁹ *Ibid.*, 230.

reassessment of the timeline of Islamic intellectual and political decline, suggesting a more complex interplay of factors and a later onset than traditionally perceived.

In his 2015 work, *Islamic Intellectual History in the Seventeenth Century*, Rouyheb challenged Halil Inalcik's assertion that the 17th century marked the triumph of fanatics. Rejecting portrayals of the period as degenerate, as well as nationalists and Islamists who in many ways portrayed the period as degenerate and backward, Rouyheb boldly contended for the existence of a significant intellectual life in the Ottoman Empire and Morocco, drawing evidence from primary sources authored by scholars from both regions.³⁰ This nuanced understanding by Rouyheb, similar to Hodgson, has also prompted reassessment of the timeline of Islamic intellectual and political decline, suggesting a more complex interplay of factors and a later onset than traditionally perceived, thus opening avenues for further scholarly exploration.

Concurring with Rouyheb's stance, Mahmūd Syākir vehemently opposed the narrative of decline propagated by modernists and their divisive terminology, such as "new and old," "classical and contemporary," and "progress and decline."³¹ Refuting the claims of the 19th century modernists, Syākir argued that, since the 17th century, an intellectual movement has thrived, preserving the Arabic language even though the Arab region is not the focal point of civilisation. Noteworthy scholars in Egypt, like Abd al-Qadir bin Umar, known as al-Baghdādī, have played a crucial role in safeguarding Arabic literature and sciences during this period (1620–1683).³²

Following Rouyheb, Ahmad Dallal continued the critique of the decline thesis, focusing on the 18th century, a crucial period preceding Western colonialism. This era gains significance as it stands on the brink of colonial incursions, often justified by the mission to enlighten the purportedly 'bad Muslims,' as articulated by figures like Napoleon Bonaparte. Dallal challenged this narrative of decline in his 2018 work, *Islam without Europe: Traditions of Reform in Eighteenth-Century Islamic Thought*. Dallal's argument rests on two key points: first, that intellectual vibrancy persisted across various regions – India, North and West Africa, Syria, and Yemen – in the Islamic world, and second, that this dynamism was not a consequence of European influence, as it predates the colonial period.³³ He asserts that the unique development of knowledge during this time stems from the rich Islamic intellectual tradition spanning centuries.

An intriguing example from this period, highlighted by Mahmūd Syākir, is the 18th century Egyptian scholar Hasan bin Ibrahim al-Jabartī al-Aqīlī (1698–1774), better known as al-Jabartī al-Kabīr. Besides being a proficient Hanafi *faqīh* and master of linguistics and *kalam*, al-Jabartī al-Kabīr became a muftī at the age of 34. Remarkably, he also excelled in chemistry,

³⁰ Ibid., 231.

³¹ Muhammad Mahmūd Syākir, *Risālah Ilā Tsaqāfātīnā* [A Message to our Cultures] (Cairo: Maktabah Usrah, 1977), 80.

³² Ibid., 82.

³³ Şentürk, "The Decline of the Decline Paradigm," 233.

engineering and astronomy, becoming a subject of study for later European Orientalists.³⁴ The existence of scholars like al-Jabartī challenges the decline narrative and attests to the preservation of natural sciences, countering claims by modernists in Egypt who insist on importing European teachers and accuse Al-Azhar scholars of neglecting these sciences.

Moreover, the challenge to the narrative of decline extended into the 18th century, involving scholars like Peter Adamson. While Dallal focused on the pre-colonial era, Adamson explored the impact of 19th century colonialism on the Islamic intellectual landscape. As a historian of philosophy, he contests the notion that Islamic philosophy regressed post-Ibn Rushd, asserting the production of philosophical works persisted for centuries. Adamson emphasises that philosophy and rationalism extend beyond Aristotelian thought, encompassing theologians as well. According to Adamson, this intellectual activity continued unabated until the decline of the Ottoman dynasty.³⁵

Thus, while the Renaissance was unfolding in Europe with the establishment of centres of learning such as the Florentine Academy and Collège de France in Paris,³⁶ these institutions had, by the mid-16th century, already made significant contributions to knowledge through the efforts of their scholars, such as Francis Bacon, who emphasised empirical research and the scientific method; Galileo Galilei, whose telescopic observations supported the heliocentric model; Johannes Kepler, who introduced mathematical laws of planetary motion; René Descartes, who developed analytical geometry and mechanistic philosophy; and Isaac Newton, who unified mechanics with his laws of motion and universal gravitation.³⁷ Their collective work marked a shift from speculative reasoning to empirical observation and mathematical precision, laying the foundation for contemporary scientific enquiry. However, during the same period, the development of knowledge did not cease in the Islamic world. As explained by the aforementioned historians, the intellectual dynamism in the Islamic world persisted from the 16th to 18th centuries.

This explanation suggests parallel revivals in Islamic and Western civilisations, particularly in intellectual growth, occurred simultaneously. Marshall G. S. Hodgson, as a pioneer, challenged this declinist paradigm, arguing that the 16th century marked the zenith of Muslim dominance, not its decline. Khaled el-Rouayheb continued this critique, asserting that the 17th century witnessed active intellectual engagement, thereby challenging perceptions of decline. Consequently, el-Rouayheb shifted the onset of decline into the 18th century. Ahmad Dallal further extended this timeline, highlighting the intellectual vibrancy of the 18th century prior to European influence. Meanwhile, Peter Adamson placed the initiation of stagnation in the late 19th and early 20th centuries. These reassessments underscored the need to reconsider the conventional narrative of decline and recognise the enduring intellectual dynamism within Islamic civilisation and the Western civilisation.

³⁴ Syākir, *Risālah Ilā Tsaqāfātīnā*, 84.

³⁵ Şentürk, "The Decline of the Decline Paradigm," 234–35.

³⁶ Hamdī Zaqqūq, *Dirāsāt Fī Al-Falsafah Hadītsah*, 17–18.

³⁷ Reijer Hooykaas, "The Rise of Modern Science: When and Why?," *The British Journal for the History of Science* 20, no. 4 (1987).

To conclude, one thing that must be acknowledged is the interconnectedness between these two civilisations, Islam and Europe, with the contribution of Greek thought. Especially during this simultaneous renaissance, both played a role in exchanging knowledge through translation or works to develop the legacy of Greek thought. However, the perceived dominance of Europe stems from military success, notably colonisation, rather than a decline in scientific pursuits. The progression of knowledge does not guarantee military supremacy, as warfare hinges on myriad factors. Following the fall of the Ottoman Empire, Islamic science continued to thrive within its own framework. The predicament arises when the West, in a position of power, imposes its scientific constructs on others, perpetuating the narrative of decline.

AL-AZHAR AS TARGET OF THE DECLINE NARRATIVE

Egypt holds significance in the examination of modernist initiatives due to its status as the most populous Arab country in the Middle East. Meanwhile, Al-Azhar, as one of the oldest educational institutions, wields considerable influence in the Muslim world. Justin K. Stearns notes the 19th century as a pivotal era for modernism projects in Egypt, spearheaded by Muhammad Alī, encompassing sweeping reforms spanning administration, the establishment of a modern army, and secular education, collectively known as the Tanzīmat Reform (1839–1876).³⁸

Muhammad Alī's educational reforms gained traction in the latter half of the 19th century. Despite initial resistance from some quarters, including the *ulama'* of Al-Azhar, there was gradual acceptance of the European education model. This transition occurred concurrently with a narrative campaign by modernists, portraying the conservatism of the *ulama'* as a hindrance to progress.³⁹ The modernists, owing to their proximity to authorities and control over media, successfully marginalised the conservative *ulama'*, framing them as obstacles to the defined progress.

Advocating for the widespread adoption of *ijtihād*,⁴⁰ challenging *taqlīd*⁴¹ inspired by the Protestant reform, and emphasising the importance of studying modern sciences, particularly natural sciences, were integral aspects of the educational reform efforts. Rifā'ah al-Taḥthāwī, a student dispatched to France by Muhammad Alī, reinterpreted the prophetic *ḥadīth*'s notion of "useful knowledge." He stressed the inclusion of applied sciences in the category of useful sciences, contending these had lost popularity among Egyptian Muslim scholars.⁴²

A more direct assault on the narrative of decline is evident in the actions of the Persian scholar Jamāl al-Dīn al-Afghānī. In 1869, as detailed by Indira Falk Gesink, al-Afghānī arrived

³⁸ Justin K. Stearns, *Revealed Sciences: The Natural Sciences in Islam in Seventeenth-Century Morocco* (Cambridge University Press, 2021), 12.

³⁹ Gesink, *Islamic Reform and Conservatism*, 59.

⁴⁰ *Ijtihād* is the process of independent reasoning by Islamic scholars to interpret Islamic law when there are no explicit texts in the Qur'ān or *ḥadīth* addressing an issue.

⁴¹ *Taqlīd* refers to the practice of following the legal opinions and interpretations of established Islamic scholars without questioning or seeking independent reasoning. It involves adhering to the decisions of recognised authorities in Islamic law rather than engaging in personal interpretation or *ijtihād*.

⁴² *Ibid.*, 60–61.

in Egypt, instructing Al-Azhar students. In his teachings, he consistently underscored the use of journalism for cultural revitalisation, disparaging scholars whom he deemed unfit for this role, claiming “Their wick is narrow, the fire that burns is small, unable to illuminate its surroundings,”⁴³ according to al-Afghānī.

Until 1870, the journalistic movement dominated public opinion, as Afghānī propagated the narrative that Al-Azhar, with its educational system, epitomised social stagnation. His students, influenced by European models, attributed the progress of Europe to science, considering it an absolute prerequisite for Egyptian and Muslim advancement.⁴⁴ In 1881–1882, journalists within al-Afghānī’s circle consistently emphasised, in their writings on educational reform, the imperative inclusion of modern sciences in education.⁴⁵

Muhammad Abduh, arguably al-Afghānī’s most renowned student from Al-Azhar, whose name now graces one of the halls at Al-Azhar University, criticised Al-Azhar, describing it as lacking an organised curriculum and offering irrelevant subjects. He even referred to Islamic scholars, including his own, as “ignorant fanatics.”⁴⁶ Similarly, Ali Mubarak, appointed administrator of the Ministry of Education by Khedive Ismail in 1871, accused Al-Azhar scholars of dismissing history, geography, philosophy and mathematics as wasteful pursuits. Ali asserted the experts at Al-Azhar focused solely on teaching texts, lacking wisdom.⁴⁷

However, it is crucial to emphasise that amid all the critical remarks directed at Al-Azhar and accusations of retrogression, these modernists were, in essence, conscious collaborators with Western agendas. While Tahthāwī, al-Afghānī and Abduh were vocal opponents of colonialism, their endeavours to modernise Egypt often aligned with Western colonisers’ interests at that time. Particularly concerning the narrative of the decline of natural and applied sciences, their protests inadvertently reinforced the dichotomy between religion and science, a characteristic feature of modern Western thought, from which Islam is entirely distinct. Essentially, the modernists contested an issue that had never been a point of contention in the Islamic intellectual tradition.

RESPONDING TO ACCUSATIONS: AL-AZHAR AND ITS MANUSCRIPTS

European modernism faces its own critique, with religious humanists like Goethe, George Bernard Shaw, Bertrand Russell, Alexis Carrel, Fritjof Capra and Franz Fanon highlighting its dual nature – a significant achievement yet a potential disaster for humanity’s future. They argue that its emphasis on materialism is at the expense of spiritual values.⁴⁸ Within modern

⁴³ Ibid., 72.

⁴⁴ Ibid., 76–77.

⁴⁵ Ibid., 83.

⁴⁶ Indira Falk Gesink, “Islamic Reformation: A History of Madrasa Reform and Legal Change in Egypt,” *Comparative Education Review* 50, no. 30 (2006): 335.

⁴⁷ Gesink, *Islamic Reform and Conservatism*, 45.

⁴⁸ Maiwan, “Cosmology of History,” 167.

science, Seyyed Hossein Nasr identifies a critical issue: its secular perspective fails to recognise Divine traces in the natural order.⁴⁹

Similarly, Egyptian modernists are not immune to criticism from self-proclaimed guardians (*muhāfizūn*) of modernisation projects, who perceive them as excessive and detrimental to the established Islamic intellectual tradition. The criticism stems from varied perspectives that modernists need to reconsider, with many objections being technical rather than ideological, especially concerning the incorporation of scientific studies at Al-Azhar.

In this section, this article first presents the conservatives' refutation against the accusation of Al-Azhar being anti-science. The modernists' narrative, as convincingly portrayed in the previous chapter, depicts Al-Azhar as lacking, ignorant and stagnant in terms of Islamic education. After presenting these refutations, this article will showcase manuscripts demonstrating the genuine interest of Al-Azhar scholars in natural sciences until the 19th century, challenging the widespread narrative of decline.

The objections raised by conservatives against introducing science subjects at Al-Azhar mark the initiation of various considerations. One concern is that students at Al-Azhar, accustomed to curiosity about new topics, might be diverted from religious studies. Muhammad al-Hifnī, an Al-Azhar scholar, fears that delving into natural and applied sciences could consume students' time, potentially diminishing their expertise in religious matters.⁵⁰ Hence, teaching natural and applied sciences was deemed impractical.

Financial considerations also come into play. According to Hasan Husni al-Tuwayrani, editor of the literary journal *al-Nil*, Al-Azhar, as a *waqf*⁵¹ institution, is theoretically enduring, focusing on religious sciences like *fiqh* (Islamic jurisprudence), *tafsīr* (Qur'ānic commentary) and *ḥadīth* (the purported words, actions and silent approvals of Prophet Muhammad). Changes, according to al-Tuwayrani, would violate the specified purposes in numerous *waqf* charters, posing a challenge to longstanding legal provisions.⁵² The defenders of Al-Azhar primarily raise technical objections related to the practical implementation of science education at the institution.

Furthermore, addressing the ideological aspect, Muhammad al-Inābī and Muhammad al-Bannā, a Shaykh of Al-Azhar and the Mufti of the Hanafi Shaykh at the time, responded to charges made by Alī Mubārak. In 1888, Judge (*qādī*) Muhammad Bayram sought clarification on the legal status of studying various sciences, including mathematics, geometry, arithmetic, astronomy and chemistry. Shaykh al-Inābī affirmed that these sciences align with religion, encouraging students to pursue them for the greater good. Regarding natural sciences with distinct Western perspectives, such as the 'Big Bang' theory in physics, al-Inābī suggested not

⁴⁹ Seyyed Hossein Nasr, *Islam, Sains, Dan Muslim* (Yogyakarta: IRCiSoD, 2022), 25.

⁵⁰ Gesink, "Islamic Reformation," 338.

⁵¹ *Waqf* is an Islamic charitable endowment, typically involving donating a property or asset for religious, educational or social purposes. The donated asset is maintained to generate income or benefits for a specific cause or community, and its use is generally intended to be perpetual.

⁵² Gesink, "Islamic Reformation," 338.

applying such views to the study of the natural sciences in question. Seventeen days later, Muhammad al-Bannā issued a *fatwa* supporting al-Inābī's stance.⁵³

The counterargument also finds support in the manuscripts housed in the Jāmi' al-Azhar library, serving as the primary resource for this study. While historians and modernists have been confined to a decline-period model of enquiry, limiting their access to these sources, the manuscripts in this library emerge as unequivocal voices conveying the truth. The electronic library of Jāmi' al-Azhar reveals a minimum of 20 manuscripts on natural sciences, as shown in the table below, with the possibility of more. This article specifically includes those whose names are known between the 16th and 19th centuries, regardless of whether the author lived during that time or if their writings were copied within that period.

Table 1: Natural sciences manuscripts in the electronic library at Jāmi' al-Azhar

Author	Title	Category	Preservation number	Copy year
Muhammad bin Abī al-Fathi al- Fawī al-Mishrī al- Syāfī' al-Shūfī (853 H – 1449 CE)	Al-Rukhāmah bi Tharīq al-Handasah	Geometry	131333	-
Ahmad Tāib bin Usmān al-Zādah (1136 H – 1723 CE)	Syarhu Risālah al-Mawlā Abd al-Wahhāb al-Muta'alliqah bi Syain min al-Handasah fī Daf'i Istihālah al-Isrā'	Geometry	5473	1217 H – 1802 CE
Muhammad bin Alī al-Hamīdī al- Rūmī al-Hanafī (1170 H – 1756 CE)	Risālah fī Ilmi al-Falak	Astronomy	8171	1160 H – 1747 CE
Bisyārah Ahmad Bisyārah al-Dimyāthī (1244 H – 1828 CE)	Hāsyiah Bisyārah al-Dimyāthī fī Ilmi al-Falak	Astronomy	2279	-
Hasan bin Darwīsy bin Abdillāh bin Muthāwī' al-Mishrī Syaikh al-Azhar (1254 H – 1838 CE)	Risālah fī Ilmi al-Jabar wa al-Muqābalah	Mathematics	28908	1286 H – 1869 CE
Muhammad bin Muhammad bin Ahmad al-Ghazālī al-Dimasyqī (912 H – 1506 CE)	Al- Lum'ah al-Mardīniyyah fī Syarhi al-Yāsmīniyyah	Mathematics	3613	1167 H – 1753 CE
Muhammad bin Muhammad bin Ahmad al-Ghazālī al-Dimasyqī (912 H – 1506 CE)	Al- Tuhfah al-Mārdīniyyah fī Syarhi al-Yāsmīniyyah	Mathematics	5032	-
Alī bin Muhammad bin Abd al-Rahmān bin Alī (1066 H – 1655 CE)	Al- Sir al-Maknūn fī Madhi al-Qahwah wa al-Ban	Medical	42810	-
Al-Husain bin Abdillāh bin Sīnā (428 H – 1036 CE)	Arjūzah Ibn Sīnā fī al-Thīb	Medical	53615	1163 H – 1749 CE
Mahdī bin Alī bin Ibrāhīm al-Shanburī al-Yamānī (815 H – 1489 CE)	Risālah fī Ilm al-Thīb	Medical	95673	1177 H – 1763 CE

⁵³ Gesink, *Islamic Reform and Conservatism*, 118.

Author	Title	Category	Preservation number	Copy year
Muhammad bin Ahmad bin Rusyd al-Andalusī al-Hafid (595 H – 1198 CE)	Syarh ibn Rusyd alā Arjūzah al-Thīb	Medical	42776	1293 H – 1876 CE
Muhammad al-Athār al-Dimasyqī (1234 H – 1818 CE)	Syarh Manzhūmah Hasan al-Athār fī Ilmi al-Tasyrīh	Medical	6509	1227 H – 1812 CE
Adnān bin Nashr bin Manshūr al-Baghdādī al-Thabīb (548 H – 1153 CE)	Al-Kāfi fī al-Thīb	Medical	95676	1275 H – 1858 CE
Abd al-Wahhāb bin Ahmad bin Alī al-Hanafī al-Mishrī al-Syāfi'ī (973 H – 1565 CE)	Mukhtashar Tazkirah al-Suwaidī fī al-Thīb	Medical	53612	987 H – 1579 CE
Ibrāhīm bin Ahmad al-Syawī al-Dasūqī al-Syāfi'ī (1204 H – 1789 CE)	Ma'niyyah al-Ma'anī fī Shinā'a al-Thīb min al-Ikhwān	Medical	53614	-
Mahmūd bin Ilyās al-Syirāzī al-Thābīb (730 H – 1329 CE)	Al-Hāwī fī Ilm al-Tadāwī	Medical	7389	996 H – 1587 CE
Ahmad bin Ahmad al-Juhūrī al-Dharīr (1293 H – 1876 CE)	Muqaddimah fī Ilm al-Thīb	Medical	131419	-
Muhammad bin Umar bin Mubāarak bin Abdillāh al-Hamīrī al-Hadhramī al-Syāfi'ī (930 H – 1523 CE)	Syarh bi Harqi alā Arjūzatihi fī al-Thīb	Medical	3496	-
Shālih bin Nashrullāh bin Salūm al-Halbī (1081 H – 1670 CE)	Al-Thīb al-Jadīd al-Kimyā'ī al-ladzī Ihtara'hu Paracelsus	Medical	62120	

These manuscripts serve not only as crucial evidence to counter the modernists' narrative of decline but also reveal intriguing insights on closer examination. For instance, Usmān Zādah's use of geometry to refute the perceived impossibility of the *Isrā'*⁵⁴ event demonstrates the historical connection between religion and science in pre-modern Egypt. Rather than being contradictory, they were mutually supportive, reminiscent of Hamid Fahmy Zarkasyi's lecture on "Building a Civilization of Science in Islam," emphasising science's role in serving Sharia rather than overshadowing it – a concept that underlies the contemporary uncivilised state.⁵⁵

Furthermore, the work of Muhammad bin Abī al-Fathi al-Fawī al-Mishrī al-Shūfi, focusing on geometry, stands in opposition to those who blamed Abu al-Hāmid al-Ghazālī for the perceived decline of science due to Sufism. Within Al-Azhar, Shaykh Hasan al-Attār provides

⁵⁴ *Isrā'* is a pivotal event in Islamic history, marking the miraculous nocturnal journey of Prophet Muhammad from Mecca to Jerusalem. This extraordinary voyage was believed to have occurred in a single night.

⁵⁵ Hamid Fahmy Hamid, "Building the Civilization of Science in Islam" (Public Lecture, Institute for the Study of Islamic Thought and Civilizations (INSIST), 2023, January 7).

clear evidence that Al-Azhar was not anti-science. In the field of medicine, he served as the director of the medical college and championed the importance of dissecting corpses and challenging prevailing taboos.⁵⁶ Al-Attar, not an ordinary Azharite, served as the grand sheikh of Al-Azhar from 1830 to 1835.

As explained by Shālih ibn Nashrullāh ibn Salūm al-Halbī, the engagement with the medical science of Swiss figure Paracelsus (1493–1541), often regarded as the father of toxicology, exemplifies how Al-Azhar continues to read and develop the scientific tradition without being confined to specific tendencies. This is further evidenced by the copying of works like *Arjūzah Ibn Sīnā fī al-Thīb* and *Syarh ibn Rusyd alā Arjūzah al-Thīb*. Despite objections to the theological views of philosophers, notably Ibn Sīnā and Ibn Rusyd, Al-Azhar scholars did not refrain from benefitting from their medical ideas.

However, it must be acknowledged that there are numerous additional manuscripts awaiting more in-depth exploration, promising to unveil intriguing historical insights. Delving into these manuscripts could commence by examining the biographies of their authors, a task that often demands greater diligence to ascertain their identities. Were these authors mere scholars and to what extent did they specialise in these sciences? Another avenue for research involves investigating the patrons who endowed these manuscripts, thus finding a place in the Jāmi' al-Azhar library. Beyond the “who,” it is equally crucial to examine the “for what purpose” behind the donation of these manuscripts. Nevertheless, all these manuscripts collectively serve as a valuable reference to cast doubt on the modernists’ assertions regarding the decline of science in that era.

CONCLUSION

From this explanation, it can be deduced that attempting to pinpoint a specific period in history is never a neutral endeavour, particularly when history is interpreted through the lens of linear progression – a perspective that perceives human history as a singular, continuous journey, much like a train on a single track. The repercussions of adopting this historical reading model are evident when those in positions of power, particularly politically and militarily, deem themselves the rightful conductors of the human history train. This dynamic unfolded prominently in the modern era, where the West positioned itself as the culmination of history, leaving those who diverge from this trajectory behind.

This historical perspective perpetuates the dichotomy between progress and decline, fostering fatalistic viewpoints and introducing bias into research on specific historical periods. Many scholars of Islamic history have recently recognised this, prompting numerous revisions in determining the decline or golden age of Islamic civilisation. Criticising the linear progression theory of history offers a crucial advantage: it allows for the consideration of multiple golden ages or revivals. This is precisely what occurred between the 16th and 19th

⁵⁶ Christopher de Bellaigue, *The Islamic Enlightenment. The Struggle between Faith and Reason: 1798 to Modern Times* (New York: Liveright, 2017), 26–33.

centuries in the interactions between Islamic and European civilisations, culminating in Europe's heightened dominance over Islam due to colonialism.

European colonisation was aimed not only at resource extraction and industrial market expansion but, more significantly, at subjugating those labelled as 'others' to compel their submission and adherence. Consequently, the narrative of decline emerged, with modernism positioned as the remedy for this perceived decline. In Egypt's context, modernism infiltrated education by deriding centuries of established Islamic intellectual tradition. Al-Azhar faced allegations of neglecting applied and natural sciences, deemed modern sciences in the modernist context.

Contrary to this accusation, numerous Islamic scholars and self-proclaimed conservative figures addressed the issue by focusing on technical rather than ideological objections. Al-Azhar does not oppose science; ancient manuscripts in the Jāmi' al-Azhar library attest to its engagement with scientific pursuits. The narrative of decline has evidently blinded historical researchers, particularly modernists in Egypt, preventing them from objectively interpreting primary sources. This lack of understanding may stem from intentional ignorance for political motives or unwitting entrapment in the decline narrative constructed by the West. Either way, their interests align indirectly with the Western agenda to diminish the significant role of Islam on the global stage of human history.

BIBLIOGRAPHY

- Aftab, Macksood. "Ghazali, Islamophobia and the Myth of Islamic Decline." *Muslim Philosophy*, n.d. <https://www.muslimphilosophy.com/aftab/wp-content/uploads/2013/12/The-Myth-of-Islamic-Decline.pdf>.
- Al-Ghazālī, Abū Hāmid. *Ihyā' Ulūm al-Dīn* [Renewal of Religious Sciences]. Vol. 1. Darul Hadits, n.d.
- Al-Ilmiyyah, Tsāqifat al- Safā. "Electronic Library of Jāmi' Al- Azhar." *Masyikhah al-Azhar: Maktabah Syāmilah*, 2013.
- Al-Khalīf, Iwād, and Qāsim Alī Sa'īd. *Al-Jāmi'ūn Bayna l-Ulūm l-Shar'iyya Wa l-Ulūm al-Tajribiyya* [The Integrators of Sharia Sciences and Empirical Sciences]. Dubai: Jāiza Dubay al-Dawliyya li l-Qur'ān al-Karīm, 2015.
- Al-Zaidī, Mufīd. *Madkhal Ilā Falsafat Al-Tārikh* [An Introduction to the Philosophy of History]. Amman: Darul Manahij, 2006.
- Badawi, Abdurrahman. *Mausūah Al-Falsafah*. Vol. 2. Beirut: Muassasah Arabiyyah liddirasat wan nasyr, 1984.
- Benalhasan, Badrān. *Al-Khoshāis al-Amah Li al-Hadhārah al-Gharbiyyah Inda Mālek Bennabī*. al-Jāmi'ah al-Ālamiyyah Māliziyya, 1998.
- De Bellaigue, Christopher. *The Islamic Enlightenment. The Struggle between Faith and Reason: 1798 to Modern Times*. New York: Liveright, 2017.
- Gesink, Indira Falk. *Islamic Reform and Conservatism: Al-Azhar and the Evolution of Modern Sunni Islam*. I. B. Tauris, 2010. <https://doi.org/10.5040/9780755623891>.
- Gesink, Indira Falk. "Islamic Reformation: A History of Madrasa Reform and Legal Change in Egypt." *Comparative Education Review* 50, no. 30 (2006): 325–345.
- Gutas, Dimitri. *Greek Thought, Arabic Culture: The Graeco-Arabic Translation Movement in Baghdad and Early Abbasid Society*. New York: Routledge, 1998.
- Hamdī Zaqqūq, Mahmūd. *Dirasāt Fī Al-Falsafah Haditsah* [Studies in Modern Philosophy]. 2nd ed. Cairo: Dar al-Tiba'at al-Muhammadiyyah, 1998.
- Hamid, Hamid Fahmy. "Building the Civilization of Science in Islam." Public Lecture, Institute for the Study of Islamic Thought and Civilizations (INSIST), 2023, January 7.
- Hitti, Philip K. *History of the Arabs*. 10th ed. London: Higher and Further Education Division Macmillan Publishers Ltd, 1984.
- Hooykaas, Reijer. "The Rise of Modern Science: When and Why?" *The British Journal for the History of Science* 20, no. 4 (1987): 453–73.
- Iqbal, Muzaffar. *The Making of Islamic Science*. Malaysia: Islamic Book Trust, 2009.

- Maiwan, Mohammad. "Cosmology of History in the Philosophy of History: Schools of Thought, Theories, and their Developments." *Indonesian Journal of Humanities* 3, no. 2 (2013), 160–70.
- Mostafa, Noha. "The Modernization of Egypt in the Nineteenth Century: A Comparison with the Japanese Case." *Titech Studies in Science, Technology and Culture* 18 (2015): 110–20.
- Nasr, Seyyed Hossein. *Islam, Sains, Dan Muslim*. Yogyakarta: IRCiSoD, 2022.
- Nasr, Seyyed Hossein. *Knowledge and the Sacred*. New York: Crossroad, 1989.
- Önder, Murat, and Fatih Ulaşan. "Ibn Khaldun's Cyclical Theory on the Rise and Fall of Sovereign Powers: The Case of the Ottoman Empire." *Adam Academy Journal of Social Sciences* 8, no. 2 (2018): 231–66. <https://doi.org/10.31679/adamakademi.453944>.
- Sabbagh, Mahmoud Reza Ghorban. "Examining the Relationship between 'Science' and 'Religion' in the Socio-Cultural Context of the Renaissance: A Kuhnian Reading of Bacon's New Atlantis." *International Journal of Society, Culture & Language* 8, no. 1 (2020): 60–69.
- Şentürk, Recep. "The Decline of the Decline Paradigm: Revisiting the Periodisation of Islamic History." In *Niedergangsthesen auf dem Prüfstand/Narratives of Decline Revisited*, edited by Bacem Dziri and Merdan Güneş, 213-217. Reihe für Osnabrücker Islamstudien, vol. 38. Berlin: Peter Lang, 2020. <https://doi.org/10.3726/b17739>.
- Stearns, Justin K. *Revealed Sciences: The Natural Sciences in Islam in Seventeenth-Century Morocco*. Cambridge University Press, 2021.
- Straus, Anseirn, and Juliet Corbin. *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. Newbury Park, CA: Sage, 1995.
- Syākīr, Muhammad Mahmūd. *Risālah Ilā Tsaqāfātīnā* [A Message to our Cultures]. Cairo: Maktabah Usrah, 1977.
- Unal, Nedim, and Omur Sayligil. "Anatomy of the Eye from the View of Ibn Al-Haitham (965-1039). The Founder of Modern Optics." *Saudi Medical Journal* 30 (2009): 323–28.
- Zarkasyi, Hamid Fahmy. "Epistemological Implication of Al-Ghazzālī's Account of Causality." *Intellectual Discourse* 26 (2018), 51–73.

APPENDIX

Below are some of the manuscripts that I found in the Jāmi' al-Azhar electronic library. I only include a few manuscripts that represent each science category.



Figure 1. This is one of the descriptions in the book *Risālah fī Ilmi al-Falak*, on which page Maḥdī bin Alī bin Ibrāhīm al-Shanburī al-Yamānī (815 AH–1489 CE) explains about month turnover during the year in astronomy



Figure 2. Muhammad bin Muhammad bin Ahmad al-Ghazālī al-Dimasyqī (912 AH – 1506 CE) in *Al-Tuhfah al-Mārdīniyyah fī Syarhi al-Yāsmīniyyah* explains the division of inheritance in his book on mathematics



Figure 3. Discussion of geometry in the book *Al-Rukhāmah bi Tharīq al-Handasah* by Muhammad ibn Abī al-Fathī al-Fawī al-Mishrī al-Shāfi’ī al-Shūfī (853 AH – 1449 CE)



Figure 4. These are among the poems that Ibn Sīnā wrote to facilitate his explanation of medicine. Ibn Sīnā’s *Arjūzah fī al-Thib* was copied by a man named Sayyid Abdullāh Abu al-Afn in the 18th century and is now in the library of al-Azhar



Figure 5. This is the first page of *Risālāh fī Ilmī al-Jabar wa al-Muqābalah* by Hasan bin Darwīsh bin Abdillāh bin Muthāwi’ al-Mishrī Shaykh al-Azhar (1254 AH – 1838 CE) in mathematics (algebra)