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RESEARCH ARTICLE

History of science, religion and the 'big picture'

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Abstract

The academic subfields of 'science and religion' and 'Islamic sciences' have witnessed significant developments in recent decades. Despite historians discrediting outdated narratives, persistent ideas within the public sphere prompt the need for a comprehensive 'big picture'. This paper examines the historiographical developments in the fields of 'science and religion' and 'Islamic sciences', emphasizing the necessity for a 'big picture' that acknowledges the intricate histories of these areas. It traces the evolution of both fields, challenging the 'conflict thesis' and the 'Golden Age' narrative, and advocating for interdisciplinary perspectives that are global. This paper aims to advocate for an approach defining 'science' and 'religion' within their temporal and geographical contexts, to foster a deeper understanding of their intertwined histories.

> Science without religion is lame, religion without science is blind
>
> Albert Einstein

> Did you know Einstein secretly converted to Islam?
>
> Anonymous viral WhatsApp forward

In August of 1874, in his address before the British Association, physicist John Tyndall (1820–93) raised a pertinent issue concerning the omission of certain 'Arabian' figures in the historical record. He aptly acknowledged, 'if all this be historic truth (and I have entire confidence in Dr. Draper) well may he "deplore the systematic manner in which the literature of Europe has continued to put out of sight our scientific obligations to the Mahomedans"'.[1] Quoting from John William Draper's (1811–82) infamous *A History of the Intellectual Development of Europe* (1863), Tyndall criticized the omission of certain non-European contributions from narratives in the history of science. Specifically, Tyndall highlighted the oversight regarding the contributions of Alhazen (965–1040).[2] The subtext here is important. It is Draper and Andrew Dickson White (1832–1918), an American historian and diplomat, who are often cited as the originators of the so-called

1 John Tyndall, *Fragments of Science: A Series of Detached Essays, Addresses, and Reviews*, vol. 2, New York: D. Appleton, 1898, pp. 151–2. I thank Bernard Lightman for drawing my attention to this quote.

2 Alhazen, also known as Ibn al-Haytham (965–*c.*1040), was a prominent polymath celebrated for his groundbreaking work in optics, notably *Kitab al-Manazir* (The Book of Optics), which profoundly influenced the understanding of vision and perception.

'conflict thesis', or the notion that there is an intrinsic conflict between the categories of science and religion.[3] However, this seemingly progressive inclusion of non-Western contexts by Tyndall had its own problematic politics. Tyndall, like many late nineteenth-century scientific thinkers, reinforced the view of a so-called 'Islamic Golden Age'.[4] In doing so, he promoted the subsequent decline narrative in Islamic and Arabic science that was adopted by certain orientalists as well.[5]

The academic subfields of 'science and religion' and 'Islamic sciences' have witnessed significant developments in recent decades. It is important to note that 'Islamic sciences' is distinct from several other topics, such as the relationship between Islam and science, the history of medicine, and specific topics like the relationship of science and Qur'anic exegesis. While the field of 'science and religion' finds its origins in the nineteenth century, the development of 'Islamic sciences' emerged from orientalist scholarship and its associated colonial influences. These fields are influenced by their respective historical and cultural contexts, such as the standardization of modern science, the impact of European imperialism around the world, and the development of new intellectual paradigms. While the former field focused on debunking the idea of conflict between science and religion since the early 1990s, the latter field sought to dispel notions of decline and stagnation in Islamic civilizations. However, both fields encountered a common challenge faced by the broader discipline of history of science in the 1980s and 1990s – the inability to provide comprehensive narratives or a 'big picture'. This issue was exacerbated by the so-called 'science wars', where disputes highlighted deep divisions over the nature and interpretation of scientific knowledge, making it even more difficult to achieve a unified, overarching understanding of the development and impact of science throughout history.[6] Despite this, I argue that developing a 'big picture' of science and religion can provide scholars with a more comprehensive understanding of the topic, by exhibiting a diverse engagement with various world views, disciplines and geographic regions, thereby offering potential avenues for advancement. This paper will initially delve into the historiographical shifts within the field of science and religion, tracing its evolution from nineteenth-century origins to contemporary perspectives, while also examining common public understandings and misconceptions. Subsequently, it will explore the historiography of Islamic science, analysing its development and current scholarly paradigms, alongside a critical examination of public perceptions. Furthermore, the paper will assess the current state of the field of Islamic science, highlighting its diverse engagement with interdisciplinary perspectives and global contexts. While professional historians have discredited outdated narratives in both realms, certain ideas persist within the broader public sphere. The question arises: is there a need for a 'big picture' to tackle this issue? This paper aims to address this question and present a way forward, one that defines 'science' and 'religion' in their temporal and geographical contexts.

3 John William Draper, *History of the Conflict between Religion and Science*, New York: D. Appleton and Company, 1874; Andrew Dickson White, *A History of the Warfare of Science with Theology in Christendom*, 2 vols., New York: D. Appleton and Company, 1896.

4 This narrative refers to a historical period spanning roughly from the seventh century to the fourteenth, during which Islamic civilizations experienced significant advancements in various fields, such as science, mathematics, medicine, philosophy, art and architecture.

5 Marwa Elshakry, '2. The invention of the Muslim Golden Age: universal history, the Arabs, science, and Islam', in Dan Edelstein, Stefanos Geroulanos and Natasha Wheatley (eds.), *Power and Time: Temporalities in Conflict and the Making of History*, Chicago: The University of Chicago Press, 2020, pp. 80–102.

6 The science wars were a series of intellectual debates and conflicts that occurred within the history and philosophy of science communities in the 1980s and 1990s. The conflicts revolved around the nature and status of scientific knowledge, and the role of science in society. For more about the aftermath see Keith M. Ashman and Philip S. Baringer (eds.), *After the Science Wars*, New York: Routledge, 2001.

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The field of science and religion

The modern category of 'religion' was established in the eighteenth century, while the category of 'science' was established in the nineteenth century.[7] For much of the nineteenth and early twentieth centuries, the predominant view of the relationship between the two was one of conflict. Historians of science and religion have increasingly recognized the complexity of the interactions between science and religion, with many arguing that the relationship has been characterized by a variety of different dynamics, including mutual support, dialogue and tension.[8] More recently, and in line with the overall movement of history of science, scholars have argued for a more global or transnational approach to the discipline.[9] However, certain myths still hold an important place in the public sphere.

The academic field of the history of science and religion is shaped in a reactionary sense by the notion of a perennial conflict between science and religion. Two publications by Draper and White, as mentioned in the introduction, sparked a wide array of responses. But the publications are more nuanced than that and not the only contributions to the notion of a conflict between science and religion. For example, philosophical positivism and the works of philosophers such as Auguste Comte (1798–1857) fanned the flames of controversy.[10] Since the 1980s, historians of science and religion have argued against the binary notions of conflict or harmony between science and religion. Leading this historiographical shift were historians such as John Hedley Brooke, Ronald Numbers and David Lindberg.[11] In *Science and Religion: Some Historical Perspectives* (1991), Brooke argued that the relationship between science and religion is complex and cannot be reduced to simplistic binaries.[12] There is a significant shift in the field from models of conflict or harmony towards the complexity thesis. But, as Brooke reflects in 2019, it is more accurately conceptualized as a principle than a thesis, because it suggests a historical methodology that refuses to break down the relationship between science and religion into simple narratives of global conflict or harmony but rather insists on empirical analysis in each historical context.[13]

However, the complexity principle leads to another issue: 'complexity' is not really an argument in and of itself.[14] It is an example of why big pictures are so difficult to produce as well. In addition to that, given its origins, there is also the issue of Eurocentrism in the

7 See Peter Harrison, *The Territories of Science and Religion*, Chicago: The University of Chicago Press, 2015.

8 For a key conversation about this see Peter Harrison and Yves Gingras, 'From conflict to dialogue and all the way back. And then back again', *Los Angeles Review of Books*, 2 February 2018, at https://lareviewofbooks.org/article/from-conflict-to-dialogue-and-all-the-way-back-and-then-back-yet-again (accessed 8 June 2022).

9 Myrna Perez Sheldon, Ahmed Ragab and Terence Keel (eds.), *Critical Approaches to Science and Religion*, New York: Columbia University Press, 2023.

10 Yiftach J.H. Fehige, 'Introduction', in Fehige (ed.), *Science and Religion: East and West*, London: Routledge, 2016, p. 3.

11 A good example of the shift in the discipline is via the content of two edited volumes by Numbers and Lindberg, one published in 1986 and the other in 2008. See David C. Lindberg and Ronald L. Numbers (eds.), *God and Nature: Historical Essays on the Encounter between Christianity and Science*, Berkeley: University of California Press, 1986; Lindberg and Numbers, *When Science and Christianity Meet*, Chicago: The University of Chicago Press, 2008.

12 John Hedley Brooke, *Science and Religion: Some Historical Perspectives*, Cambridge: Cambridge University Press, 1991.

13 John Hedley Brooke, 'Afterword: the instantiation of historical complexity', in Bernard Lightman (ed.), *Rethinking History, Science, and Religion: An Exploration of Conflict and the Complexity Principle*, Pittsburgh: University of Pittsburgh Press, 2019.

14 In the introduction to *Rethinking History, Science, and Religion*, Bernard Lightman argues that the conflicts between history, science and religion are not as straightforward as they are often portrayed, and that a more nuanced and complex approach is needed to understand the interactions between these different areas of

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field. Much of the scholarship in the field of the history of science and religion focused geographically on Western Europe and the United States, and Christianity is the dominant religion. Thus the inclusion of other perspectives, Eastern Orthodox included, is held up against this rubric. Before we can fully evaluate the complexity principle, and move towards any new narratives, we have to expand the scope of historical investigations. There is already much work in progress regarding this.[15] In recent years, the study of science and religion has expanded to include other religious traditions and the perspectives of non-Western cultures. It has also increasingly focused on the social, political and cultural factors that shape the relationship between science and religion. In the 2010s, one can point to a global turn in the field. John Hedley Brooke and Ron Numbers's *Science and Religion around the World*, a pioneering edited collection, broadened the discussion beyond Western and Abrahamic religions to include non-Western contexts and religions.[16] Alongside early and modern Judaism, Christianity and Islam, the book contained chapters on early Chinese religions, Indic religions, Buddhism, African religions and unbelief, establishing a 'global' approach to the field. While scholarship on Christianity is well developed, the book attempted to chart a way forward for non-Western topics, revealing the weaknesses of existing historiography. Thus the chapters on non-Western religions provided a less comprehensive picture than those on Christianity. Notwithstanding this, the book paved the way for new directions in science-and-religion scholarship that embraced a global perspective. Coupled with this edited volume is Sujit Sivasundaram's chapter titled 'A global history of science and religion', which was included in the edited volume *Science and Religion: New Historical Perspectives*.[17] Sivasundaram emphasized the need for a historical approach that focuses on analysing broad patterns and connections across different regions, rather than attempting to create a comprehensive history of every region. Sivasundaram also emphasized the importance of the colonial encounter in shaping the relationship between science and religion, arguing that colonialism was a significant factor in the development of modern science. Terence Keel's monograph *Divine Variations: How Christian Thought Became Racial Science* pushed this historiographical turn further. Keel demonstrates that the idea of race as a biological category was not a pre-existing concept, but rather was created and developed through the intersection of Christian theology and scientific inquiry.[18] Keel argues that the concept of race was formed through the interaction of ideas about human variation, which were initially based on religious concepts of divine creation and hierarchy, with scientific inquiry into human difference.

Given the trajectory of the field, there are promising new avenues of research in the historiography that move us beyond complexity, but not quite towards a 'big picture'. While many of the historiographical debates and developments are taking shape in edited

human knowledge. The chapters that follow demonstrate the need to move beyond complexity. See Lightman, op. cit. (13).

15 Even in the case of Christianity and science more explicitly, new publications have challenged the complex landscape. See Stuart Mathieson, *Evangelicals and the Philosophy of Science: The Victoria Institute, 1865–1939*, New York: Routledge, 2020; James C. Ungureanu, *Science, Religion, and the Protestant Tradition: Retracing the Origins of Conflict*, Pittsburgh: University of Pittsburgh Press, 2019.

16 John Hedley Brooke and Ronald L. Numbers (eds), *Science and Religion around the World*, New York: Oxford University Press, 2011.

17 Sujit Sivasundaram, 'A global history of science and religion', in Thomas Dixon, G.N. Cantor and Stephen Pumfrey (eds.), *Science and Religion: New Historical Perspectives*, Cambridge: Cambridge University Press, 2010, pp. 177–97.

18 Terence Keel, *Divine Variations: How Christian Thought Became Racial Science*, Stanford, CA: Stanford University Press, 2018.

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collections, recent works have called for critical approaches to the topic of science and religion.[19] For example, Sheldon, Ragab and Keel's *Critical Approaches to Science and Religion* incorporates schools of thought such as critical race theory, feminist and queer theory, and postcolonial theory.[20] Coupled with that is a push towards what Bernard Lightman and I have dubbed 'globality'.[21] This is echoed in Alper Yalçınkaya's recent article 'Globalizing "science and religion": examples from the late Ottoman Empire'. Yalçınkaya shows that that the discussion surrounding 'science and religion' was a global phenomenon during the nineteenth century, fostering novel conceptions of both science and religion in numerous geographical contexts.[22] Thus, while there is a historiographical move in the field from conflict, to complexity, and towards globality, there are many more interdisciplinary concerns and historical developments to incorporate into the field of the history of science and religion before there can be a novel 'big picture'. For example, in *Science and Religion in India: Beyond Disenchantment*, Renny Thomas charts a way forward by incorporating ethnographic research in non-Western contexts.[23] Thomas presents a detailed exploration of the intersection between science and religion in South Asia, highlighting the perspectives of Indian scientists and their diverse religious engagements. He challenges simplistic notions of a natural connection between science and religion in India, advocating for a nuanced understanding that transcends binary frameworks of conflict and complementarity, thereby opening up new avenues for conceptualizing these complex categories.

While academics are examining historiographical intricacies and pushing the field forward towards a consensus, there are still certain popular notions that are taken as facts about the relationship between science and religion. Perhaps the lack of a 'big picture' has contributed to some of this. Academics in the field of science and religion have tried to tackle public misconceptions by writing with general audiences in mind. For example, several authors contributed to Ronald Numbers's edited volume *Galileo Goes to Jail and Other Myths about Science and Religion*.[24] Chapters in this volume offered a short overview of the new literature in the field organized around a key event or scientific idea. It tackled myths such as the idea that the medieval Christian Church suppressed the growth of science and taught that the Earth was flat, the popular notion that Galileo was a martyr for science who was imprisoned and persecuted by the Catholic Church for his support of the heliocentric theory, and even the idea that Einstein believed in a personal God.

Let's unpack the example of the Galileo affair and how it is discussed in various manners. The narrative goes something like this: Galileo Galilei (1564–1642) was imprisoned and tortured by the Catholic Church for his defence of the heliocentric model of the solar system, which challenged the geocentric model endorsed by the Church. In 1616, the Catholic Church declared heliocentrism to be heretical, and in 1632 Galileo published his book *Dialogue Concerning the Two Chief World Systems*, which endorsed the heliocentric

19 Some of the edited volumes on the topic include Lightman, op. cit. (13); Fehige, op. cit. (10); Brooke and Numbers, op. cit. (16); Dixon, Cantor and Pumfrey, op. cit. (17).

20 Sheldon, Ragab and Keel, op. cit. (9).

21 A more thorough state of the field is presented in the introduction to the edited collection. See Bernard Lightman and Sarah Qidwai (eds.), *Evolutions and Religious Traditions in the Long Nineteenth Century*, Pittsburgh: University of Pittsburgh Press, 2023.

22 M. Alper Yalçınkaya, 'Globalizing "science and religion": examples from the late Ottoman Empire', *BJHS* (2022) 55(4), pp. 445–58.

23 Renny Thomas, *Science and Religion in India: Beyond Disenchantment*, London and New York: Routledge, Taylor & Francis, 2022.

24 Ronald L. Numbers (ed.), *Galileo Goes to Jail and Other Myths about Science and Religion*, Cambridge, MA: Harvard University Press, 2009.

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model and criticized the Church's position.[25] Galileo was subsequently summoned to Rome by the Inquisition, where he was interrogated and ultimately forced to recant his views under threat of torture. Thus there is a clear conflict between science and religion due to the persecution and torture of Galileo. In the chapter 'Myth 8: that the Church hindered the progress of science by condemning Galileo', Maurice A. Finocchiaro challenges the myth that the Catholic Church hindered the progress of science by condemning Galileo for his support of the heliocentric theory.[26] He argues that the real story is more complicated than this simplistic view suggests. Galileo saw himself as a devout Catholic and his conflict with the Church had more to do with politics, the need for the Catholic Church to assert its authority in the wake of the Protestant Reformation, and personal animosity than with science itself. To add another layer, during this period, the Jesuits were heavily invested in the world of science, taking a global approach that leveraged colonial networks to spread and exchange scientific knowledge.[27] Their involvement ranged from astronomy to natural sciences, and they established a presence in various parts of the world, including Asia, Africa and the Americas. Galileo, at times, was part of this same network, collaborating with Jesuit scholars and benefiting from their extensive communication and dissemination of scientific ideas. Overall, the Galileo affair could also be seen as a myth perpetuated by Enlightenment thinkers who sought to create a secular narrative of scientific progress. Ultimately, Galileo's story is not a simple tale of science versus religion, but a more complicated and fascinating episode in the history of ideas. Furthermore, it is events in the twentieth century that perpetuated the myth further.[28]

While scholars who study the history of science and religion have largely moved beyond the idea that science and religion are inherently in conflict with each other, many still hold onto this notion.[29] Thus the value of a 'big picture' in the history of science and religion cannot be overstated. It is important to take a broad, inclusive view of the history of science and religion that goes beyond the traditional focus on Western Europe and Christianity in the West. Additionally, it is important to explore relationships between science and religion in other cultural and religious contexts beyond those tied to Abrahamic faiths (Judaism, Christianity and Islam). This is because different cultures and religious traditions have different ways of understanding and reconciling the relationship between science and religion, which can shed light on the diversity of human thought and experience. To re-emphasize a key point, in the field of science and religion, other world views are held up to a pre-existing rubric of Christianity. Overall, there is a need for a more nuanced approach to studying the intersection of science and religion that takes into account the complexities of both historical and contemporary perspectives. In the following section, I demonstrate how such an approach could be developed through examples from the history of Islamic science.

25 Galileo Galilei, *Dialogue Concerning the Two Chief World Systems* (tr. Stillman Drake), Berkeley, CA: University of California Press, 1953.

26 Maurice A. Finocchiaro, 'Myth 8: that the Church hindered the progress of science by condemning Galileo', in Numbers, op. cit. (24), pp. 68–78.

27 Michael John Gorman, *The Scientific Counter-revolution: The Jesuits and the Invention of Modern Science*, New York: Bloomsbury Academic, 2020.

28 The view of Galileo's conflict with the Church, along with Darwin's controversies, often serves as a simplified symbol of long-standing tensions between science and religion, which overlooks the nuanced historical contexts and is used to underscore modern concerns about this relationship, particularly in light of significant events like the counterculture of the 1960s, the environmentalism of the 1970s, the educational funding cuts of the 1980s and the 'science wars' of the 1990s. Rees, McLeish *et al.*, *War of the Words* (forthcoming 2025).

29 See Jeff Hardin, Ronald L. Numbers and Ronald A. Binzley (eds.), *The Warfare between Science and Religion: The Idea That Wouldn't Die*, Baltimore: Johns Hopkins University Press, 2018.

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Islamic science

Recently, old clips of American astrophysicist and science communicator Neil deGrasse Tyson's talk titled 'Islam's rise and fall in science' have gone viral on TikTok and YouTube.[30] In these clips, Tyson discusses the influence of Islamic scholars during the 'Golden Age of Islamic science', including their contributions to astronomy, which is evident in the Arabic names of many stars. He classifies the 'Islamic Golden Age' as a period of significant advancements in various scientific fields. Additionally, Tyson rehashes the trope that Al-Ghazali's influence led to the decline of the rational sciences in Islam.[31] Tyson's talk demonstrates how certain views of the history of 'Islamic science' are often characterized by oversimplified narratives and static views of the past. While the history of 'science and religion' as a field is moving towards a global approach, 'Islamic science' has witnessed growth in numerous interdisciplinary directions. This section presents an overview of the historiography, unpacks two case studies, and addresses how the topic has expanded beyond traditional confines, advancing postcolonial studies, interdisciplinary research and global perspectives, thereby contributing to a more nuanced understanding of scientific traditions within Islamic societies.

While trying to incorporate the Islamic or Arabic heritage in the history of science, orientalists in the nineteenth century, such as Ernest Renan (1823–92), a French scholar known for his work on the history of religion and the development of modern nationalism, and Ignaz Goldziher (1850–1921), a Hungarian Jewish scholar who is widely considered one of the founders of Islamic studies, constructed a static view of Islamic sciences.[32] The notion of an Islamic 'Golden Age' posited that with the rise of the Abbasid caliphate (750–1258), there was a translation movement.[33] This involved the translation of ancient Greek, Persian, Hindu and other texts into Arabic, primarily facilitated by Islamic scholars and patrons. The movement was centred in major intellectual hubs such as Baghdad, Damascus and Cordoba. This is considered the Golden Age of Islamic science. However, the narrative posits that the Islamic or Arabic scholars were only translators and not innovators. Often, the 'decline' is attributed to a myriad of factors, including the decline of the Abbasid caliphate, conservatism, the influence of al-Ghazali and the revival of learning in the West.[34] However, this is no longer the academic position.

The idea of a 'Golden Age' followed by decline is one that historians of Islamic science have thoroughly addressed and debunked. To quote Sonja Brentjes, the category of 'decline' is 'a temporal absurdity'.[35] Brentjes calls for a more nuanced approach to the history of science in the Islamic world, one that recognizes the diversity of scientific inquiry across time and place and resists the imposition of narrow categorizations. She argues that this approach can help to reveal the true richness and complexity of the Islamic scientific tradition and to challenge the dominant narratives that have marginalized it. Other academics have argued that the simplistic view of a Golden Age overlooks the diversity

30 Neil deGrasse Tyson, 'Islam's rise and fall in science,' at www.youtube.com/watch?v=INK_v2HELKs (accessed 23 March 2023).

31 Al-Ghazali (1058–1111 CE) was a prominent Islamic theologian, philosopher and jurist who is best known for his work *The Incoherence of the Philosophers*, in which he criticized the philosophical ideas of the time and advocated for the importance of religious revelation in understanding the world.

32 Ernest Renan, *Islam and Science*, London: Cass, 1968 (first published 1883); Ignaz Goldziher, *Die Zahiriten: Ihr Lehrsystem und ihre Geschichte*, Leipzig: Otto Schulze, 1884.

33 David C. Lindberg, *The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious, and Institutional Context, Prehistory to A.D. 1450*, Chicago: The University of Chicago Press, 1992.

34 For a more recent discussion see Shoaib Ahmed Malik, *Islam and Evolution: Al-Ghazālī and the Modern Evolutionary Paradigm*, Abingdon and New York: Routledge, 2021.

35 Sonja Brentjes, 'The prison of categories: "decline" and its company', in Felicitas Opwis and David Reisman (eds.), *Islamic Philosophy, Science, Culture, and Religion*, Leiden: Brill, 2012, pp. 131–56, 136.

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and complexity of Islamic intellectual traditions and fails to account for the many factors that shaped the development of science in the Islamic world over time.[36] For example, George Saliba, in his seminal work *Islamic Science and the Making of the European Renaissance*, argued against the 'classical narrative' of the Golden Age and declared that the foundations of Islamic scientific thought pre-date the ninth century, when Greek sources were formally translated into Arabic.[37] Instead, Saliba presents a compelling case to support the view that early translations for the use of government departments led to the development of an Islamic scientific tradition. In addition, Islamic astronomy was just one area that represented a creative response to Greek tradition, not just translation with minor improvements.[38] Similarly, Ahmad Dallal has argued that the decline of rational sciences in the Muslim world was a symptom of complex and historically specific social, political and economic factors, not the result of an inevitable unfolding of culture.[39] For him, Islamic science should be understood not as a monolithic entity, but rather as a complex and diverse collection of knowledge practices that were shaped by local contexts and influenced by interactions with other cultures.[40] He also emphasizes the importance of understanding the social, political and economic contexts in which Islamic science was produced, as well as the role of patronage and institutional support in fostering scientific inquiry.

As with the case of science and religion, while scholars of Islamic science have moved past certain assumptions and are pushing the boundaries of the discipline, there are numerous issues with the popular tropes in the field of Islamic science as well. As with the case of science and religion, while scholars of Islamic science have moved past certain assumptions and are pushing the boundaries of the discipline, there are numerous issues with the popular tropes in the field of Islamic science as well. Let us examine two examples from two different vantage points.

Going back to Al-Ghazali, some scholars have argued that his critique of philosophers and of their emphasis on reason and empirical inquiry had a negative impact on science in the Islamic world. Others argue that the decline of science in Islam was due to a complex set of factors, including political instability, economic decline, and the rise of religious fundamentalism. In a blogpost, Tim O'Neill argues that this claim is oversimplified and ahistorical, and that it ignores the complex factors that contributed to the decline of Islamic science, including political instability, economic decline and the rise of competing centres of knowledge in Europe.[41] While Al-Ghazali's ideas may have had some impact on the development of science in the Islamic world, it is important to note that the fate of science in the Islamic world was a complex and multifaceted phenomenon. It cannot be attributed to any single individual or factor. Thus, while Al-Ghazali was critical of philosophers, he was not the sole reason for the 'end of Islamic sciences'.

36 A.I. Sabra, 'The appropriation and naturalization of Greek science in medieval Islam: a preliminary statement', *Osiris* (1986) 2, pp. 8–56; Samer Akkach, *Polarising ʿilm: Science and Religion in Early Modern Islam*, Leiden: Brill, 2011; Seyyed Hossein Nasr, *Science and Civilization in Islam*, Cambridge, MA: Harvard University Press, 1968.

37 Rejecting the so-called 'classical narrative', George Saliba argues that the foundations of Islamic scientific thought were laid well before Greek sources were formally translated into Arabic in the ninth century. He uses mathematical models of planetary motion and uses them to explicate the social origins of Islamic science and then to argue that Islamic astronomy played a significant role in the rise of modern astronomy. See George Saliba, *Islamic Science and the Making of the European Renaissance*, Cambridge, MA: MIT Press, 2007.

38 There are many scholars who have published extensively on this. For example, see Jamil F. Ragep. 'Tusi and Copernicus: the Earth's motion in context', *Science in Context* (2001) 14(1–2), pp. 145–63.

39 Ahmad S. Dallal, *Islam, Science, and the Challenge of History*, New Haven, CT: Yale University Press, 2010.

40 Ahmed S. Dallal, *Beginnings and Beyond: Encounters with Science and Technology in Islamicate Societies*, Dordrecht: Springer, 2016.

41 Tim O'Neill, 'Neil DeGrasse Tyson and Al-Ghazali', *History for Atheists* (30 March 2023), at https://historyforatheists.com/2023/03/neil-degrasse-tyson-and-al-ghazali (accessed 23 March 2023).

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On the other side, you have the temporal view of Islamic science as a cornerstone of civilizational progress. A prime example is the popular 1001 Inventions exhibition.[42] It is a travelling exhibition that explores the scientific and technological achievements of Muslim civilization during the Golden Age of Islam. The exhibition highlights the contributions of Muslim scholars, scientists and inventors in fields such as mathematics, astronomy, medicine, chemistry and engineering. The exhibition features interactive displays, multimedia presentations and hands-on activities that showcase the groundbreaking innovations of Muslim civilization, such as the invention of the camera obscura, the development of algebra and the creation of the first surgical instruments. The exhibition aims to challenge misconceptions about Muslim culture and to promote cross-cultural understanding and appreciation of the diverse contributions of different civilizations to human progress. It has been showcased in various cities around the world, including London, Istanbul, New York and Abu Dhabi, and has been visited by millions of people. The exhibition is a clear response to Islamophobia and post-9/11 perceptions of Muslims.

While the 1001 Inventions exhibition has been generally well received and praised for its efforts to showcase the scientific and technological contributions of Muslim civilization, there have been some criticisms and concerns raised about certain aspects of the exhibition. Academics have called attention to issues with it. An entire edited volume titled *1001 Distortions: How (Not) to Narrate History of Science, Medicine, and Technology in Non-Western Cultures* is dedicated to this cause.[43] To highlight some of the issues scholars have raised: there is much generalization involved in this project. Some critics have argued that the exhibition presents a simplistic and homogenized view of Muslim culture and history, overlooking the diversity and complexity of Muslim societies throughout history. Others have argued that the exhibition reinforces stereotypes and exoticizes Muslim culture, rather than presenting it in a nuanced and accurate way. There is the issue of overemphasizing the past – some critics have argued that the exhibition focuses too much on the historical achievements of Muslim civilization, rather than highlighting contemporary contributions and innovations made by Muslims around the world. Ironically, there is also a lack of representation! Some critics have raised concerns about the lack of representation of Muslim scholars and experts in the development of the exhibition, and the potential for non-Muslim experts to misrepresent or appropriate Muslim history and culture. Overall, while the 1001 Inventions exhibition has been praised for its efforts to promote cross-cultural understanding and appreciation of Muslim culture and history, it is important to acknowledge the criticisms and concerns raised by some scholars and experts.[44]

There is a fundamental difference between the claim that Al-Ghazali caused the decline of the Golden Age and the assertion made by the 1001 Inventions project that we cannot have modern science without Islamic science. The former is a historical perspective that traces the decline of philosophical discourse in the Islamic world to the influence of Al-Ghazali. On the other hand, the 1001 Inventions project celebrates the achievements of Islamic civilization in the field of science and technology. However, unlike the view that Al-Ghazali's ideas led to the end of philosophy, the 1001 Inventions project does not make any claims about the superiority of Islamic science over other traditions. Instead, it presents a narrative of Muslim scientific achievements and highlights the role of Islamic civilization in the advancement of knowledge during the Middle Ages. It

42 See www.1001inventions.com (accessed 29 March 2023).

43 Sonja Brentjes, Taner Edis and Lutz Richter-Bernburg (eds.), *1001 Distortions: How (Not) to Narrate History of Science, Medicine, and Technology in Non-Western Cultures*, Würzburg: Ergon Verlag, 2016.

44 For further critique see Ahmed Ragab, 'Islam intensified: snapshot historiography and the making of Muslim identities', *Postcolonial Studies* (2019) 22(2), pp. 203–19.

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also treats Islamic science as a self-contained category. But this perpetuates the Golden Age narrative. The real account is somewhere in the middle.

This discussion of Al-Ghazali and the myth of a 'Golden Age' highlights another key issue: would a master narrative stitch together the early literature with recent directions of the field? While it is true that the fall of Baghdad in 1258 is a significant turning point, there is another to consider in the historiography: the rise of the Mughal, Ottoman and Safavid empires in the subsequent centuries provided new centres of intellectual and scientific activity, fostering the continuation and advancement of scientific inquiry across diverse geographical regions. Currently, historians of Islamic science are increasingly expanding the temporal and geographical scope of the field. For example, attention is drawn to the global impact of the Ottoman Empire by numerous scholars.[45]

There are also strong arguments to cast a wider net on the definition of 'science'. This would lead to the inclusion of several new areas of investigation, such as the occult sciences. For example, Melvin-Koushki argues that while Islamic occult sciences may not conform to modern scientific methodologies, they were nonetheless considered valid forms of knowledge in premodern Islamic intellectual tradition. He suggests that the term 'science' should be understood in its historical context, rather than simply as a synonym for the modern natural sciences. In this sense, Islamic occult sciences can be considered part of the broader scientific tradition of Islam.[46]

Apart from geographic and temporal additions, scholars are drawing on insights from other fields, including anthropology, sociology and philosophy. This has led to a more holistic understanding of the development of Islamic science and has helped to highlight the importance of multidisciplinary approaches in studying this topic. There are several promising interdisciplinary directions that scholars have recently taken. In 2018, the *Immanent Frame* published a series of essays as part of a forum titled 'Science and the soul: new inquiries into Islamic ethics', providing reflections on a group of contemporary publications concerning the intersection of Islam and science.[47] The forum introduced five books that delve into various aspects of this relationship, covering topics such as thermodynamics, astronomy, psychoanalysis, psychiatry and urban planning.[48] This was a platform not only for reviewing or commenting on each individual monograph, but also for examining their collective contributions as integral components of a burgeoning shift in the anthropology and history of Islam. Each discussion initiates a range of inquiries that is significant for the examination of Muslim modernity across various spheres.

45 Harun Küçük's *Science without Leisure* explores practical naturalism in seventeenth- and eighteenth-century Istanbul, revealing how scientific practices intertwined with daily life. Daniel Stolz's *The Lighthouse and the Observatory* delves into science, Islam and empire in late Ottoman Egypt, highlighting the role of scientific knowledge in imperial contexts. Mehmet Alper Yalcinkaya's *Learned Patriots* discusses debates on science, state and society in the nineteenth-century Ottoman Empire, illuminating the complex interplay between science, politics and societal dynamics. See Daniel Stolz, *The Lighthouse and the Observatory: Islam, Science, and Empire in Late Ottoman Egypt*, Cambridge: Cambridge University Press, 2018; Mehmet Alper Yalcinkaya, *Learned Patriots: Debating Science, State, and Society in the Nineteenth-Century Ottoman Empire*, Chicago: The University of Chicago Press, 2020; Harun Küçük, *Science without Leisure: Practical Naturalism in Istanbul, 1660–1732*, Pittsburgh: University of Pittsburgh Press, 2020.

46 Matthew Melvin-Koushki, 'Is (Islamic) occult science science?', *Osiris* (2016) 31, pp. 71–93.

47 Noah Salomon, 'Science and the soul: an introduction', *Immanent Frame*, 12 September 2019, at https://tif.ssrc.org/2018/09/27/science-and-the-soul-introduction (accessed 10 January 2024).

48 The following monographs were under discussion: Omnia S. El Shakry, *The Arabic Freud: Psychoanalysis and Islam in Modern Egypt*, Princeton, NJ: Princeton University Press, 2017; Alireza Doostdar, *The Iranian Metaphysicals: Explorations in Science, Islam, and the Uncanny*, Princeton, NJ and Oxford: Princeton University Press, 2018; Stolz, op. cit. (45); Stefania Pandolfo, *Knot of the Soul: Madness, Psychoanalysis, Islam*, Chicago: The University of Chicago Press, 2018; Anand Vivek Taneja, *Jinnealogy: Time, Islam, and Ecological Thought in the Medieval Ruins of Delhi*, Stanford, CA: Stanford University Press, 2017.

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Here we see an important shift. Scholars have increasingly emphasized the importance of social and cultural contexts in shaping scientific knowledge in the Islamic world. This has led to a greater appreciation for the role of religion, politics and culture in shaping the development of science in Islamic societies.

As the field of 'science and religion' adopts a more global approach, 'Islamic science' has experienced growth in multiple interdisciplinary areas. When we expand the category from science and religion as a binary, there are several new areas to examine. Furthermore, works such as Marwa Elshakry's *Reading Darwin in Arabic* point to the intersection of a specific science – evolutionary biology – and the many boundaries the topic can cross. This includes the ability to speak about multiple religions.[49] Thus scholars are writing new narratives of the nineteenth century that, to use my own term, are 'not routed through Europe'. Apart from imperial encounters, there was another cosmopolitan intellectual network operating for nineteenth-century Muslims, in which a wide range of debates and discussions were anchored firmly in an Islamic context. While it is important to examine the imperial context and discussions with orientalists, there are fascinating intra-religious debates that stretch across the Middle East, North Africa and South Asia. This discourse not only highlights the diversity of thought but also underscores the dynamic and evolving nature of Islamic intellectual traditions across different regions and historical periods. Understanding these accounts offers valuable insights into the broader narrative of science and religion, showing how local contexts and internal dynamics contribute to the global history of scientific thought.

To sum up, this discussion of 'Islamic science' reveals a complex and dynamic landscape that defies simplistic narratives. Recent scholarship, as demonstrated in this section, has moved beyond static interpretations to embrace interdisciplinary approaches and global perspectives. By unpacking historical misconceptions, addressing the diverse contributions of Islamic societies, and exploring emerging areas of inquiry, scholars are charting new narratives that enrich our understanding of the complex interplay between science, religion and culture in Islamic societies. As the field continues to evolve, it offers valuable insights into the multifaceted nature of scientific traditions and their enduring relevance today.

Conclusion

In a 1950 lecture titled 'The incubation of Western culture in the Middle East', George Sarton (1884–1956) stated, 'now the history of science begins definitely in what we are agreed to call the Middle East, though it is impossible to say whether it began in the western part of that region, Egypt, or in a more eastern part, Mesopotamia'.[50] Echoing Draper's sentiments from earlier in this paper, Sarton was not alone in his attempts to challenge the prevailing views about the influence of the non-West in the history of science. However, as this paper has demonstrated, this acknowledgement also leads to certain historiographical distortions.

Overall, this paper has explored the historiographical developments in the academic fields of 'science and religion' and 'Islamic sciences', which have been influenced by historical and cultural contexts such as the emergence of modern science, European imperialism and the development of new intellectual paradigms. The paper notes the challenge faced by historians in providing comprehensive narratives, and the need to replace

49 Marwa Elshakry, *Reading Darwin in Arabic, 1860–1950*, Chicago: The University of Chicago Press, 2013.

50 George Sarton, 'The incubation of Western culture in the Middle East: a George C. Keiser Foundation Lecture delivered in the Coolidge Auditorium of the Library of Congress', 29 March 1950, United States, Library of Congress, 1951, p. 10.

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outdated narratives with a new 'big picture'. Whether or not it is important to have a master narrative or 'big picture' in this field is a matter of debate among historians, scholars and other experts. Some argue that having a master narrative can be useful for providing a sense of coherence and direction to the field, as well as for communicating its findings to a broader audience. Scholars have recognized that the simplistic conflict thesis has been largely discredited and are instead seeking to understand the complex interactions between science and religion in different historical and cultural contexts. At the same time, there is a growing recognition of the diversity and richness of Islamic intellectual traditions, and a renewed interest in exploring the intersections between Islamic thought and modern science. By bringing these two fields into dialogue, we can gain a more nuanced understanding of the complex relationships between science, religion and culture, and move beyond simplistic dichotomies towards more fruitful avenues of inquiry.

The convergence of the fields of 'science and religion' and 'Islamic sciences' reflects a growing recognition of the interconnectedness of knowledge systems and the need for interdisciplinary dialogue. While these fields have historically developed separately, recent efforts have sought to bridge the gap between them, acknowledging their shared concerns and potential for mutual enrichment. This paper represents in many ways my own personal journey of intellectual development, the literature I encountered that shaped by my engagement with both 'science and religion' and 'Islamic science'. Finding space for the intersection of the history of science in the nineteenth century, Islamic sciences and South Asia thus demonstrates the need for a 'big picture'. Each discipline has unique historiographical origins, rich sources and new avenues. Thus a 'big picture' would acknowledge the diversity of these areas and offer a direction that focuses on both the local and the global simultaneously. This would mean examining the broader relationship between science and religion within their respective historical and regional contexts. For instance, exploring the interplay of Islam and Hinduism with scientific and political advancements in nineteenth-century South Asia reveals distinct perspectives and contributions that enrich our understanding beyond the traditional Western-centric narrative.

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