

IBN KHALDŪN ON THE FATE OF ISLAMIC SCIENCE AFTER THE 11th CENTURY

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Recent studies in the history of Islamic science illustrate that Islam's contributions were richer and more profound than was previously thought. In their attempt to provide answers to what happened to Islamic science after the eleventh century, historians and scholars construct a simplified model that describes all branches of Islamic science in terms of failure. In this article, Ibn Khaldūn's analysis of the fate of Islamic science will be examined to show his insightful understanding of, and the failure of scholars in, understanding what happened.

Keywords: Islamic science; Ibn Khaldūn; golden age of Islamic science; decline theory; handmaiden approach to history of science.

Dominant Understanding: the Decline Theory

The enterprise of science in Islamic civilization is often periodized into a golden age followed by decline.¹ The golden age is considered to have come into existence through a gigantic endeavor to acquire and translate the ancient sciences of the Greeks between the eighth and ninth centuries. The translations era was followed by two centuries of splendid original thinking and contributions, and is known as the "golden age" of Islamic science. This so-called "golden age" is supposed to have lasted from the end of the ninth to the end of the eleventh century. The era after this

1. George Saliba, *Al-Fikr al-'Arabi al-'Ilmi: Nash'atuhu Wa Taṭāuruḥu* (Beirut: Balamand University, 1998).

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period is conventionally known as the “age of decline”.²

A survey of literature from the nineteenth century onwards demonstrates that the decline theory has become the preferred paradigm in general academia. In 1883, twenty-one years after the French translation of Ibn Khaldūn’s *Muqaddimah*, Joseph Ernest Rénan (1823-1892) declares that Islamic science³ declined after its “golden age” because of racial factors, although he placed greater emphasis on the intolerance Islam supposedly had for reason.⁴ Rénan, borrowing the idea from Voltaire (1694-1778), states that “[t]he Oriental mind is incapable of rational thought and philosophy and was responsible for blocking the development of science and learning in the Muslim world.”⁵ Max Weber (1864-1920) suggests that Islamic science declined because the Arabs were on the whole less intelligent than the Europeans, who had a superior collective mind: “Europeans are genetically endowed with comparatively greater amounts of rationality, thereby allowing for the speedier development of a rational capitalist ethic.”⁶

While recognizing that the “golden age” continued into the second half of the eleventh century, George Sarton (1884-1956) postulates that Islamic science culminated in the first half of the eleventh century. Sarton

2. Ibid.

3. Islamic science here means the natural or exact sciences that originated in or were influenced by the Islamic civilization. Arabic was the main scientific language used, but not necessarily the native language of the scientists, who might have been Persian, Turkish, or of other origins. While the terms Islamic science and Arabic science are modern historical terms within the context of Islamic civilization, this science is Islamic in the sense that it suited the new and growing needs of the Islamic civilization; was available entirely in Arabic, which replaced Syriac; and was familiar to an increasing number of translators, students, and scientists. It is in this context that the term Islamic science will be used in this article.

4. Cited in Toby H. Huff, *The Rise of Early Modern Science* (Cambridge: Cambridge University Press, 1993), 53.

5. Rénan quoted in Sardar, Z., *Orientalism* (Buckingham: Open University Press, 1999), 50. More peculiar was Rénan’s claim that the “little science and philosophy that Muslims had produced was the result of a rebellion against Islam,” and that science could only flourish in Islam in association with heresy. Rénan also believed that “the Mussulman [Muslim] has the most profound disdain for instruction, for science, for every thing that constitutes the European spirit.”

6. In Parvez Hoodbhoy, *Islam and Science: Religious Orthodoxy and the Battle for Rationality* (Pakistan: Zed Books, 1992), 2.

recognizes that intellectual activities were still very intense and of a high order during the second half of the eleventh century; however, he assumes that “[t]here was already a perceptible decline both in the quality and the quantity of the effort. This is not recognized at once, because the decline is very small and is hidden by the activity of some very great personalities.”⁷ That decline eventually set in was because “[t]he Western people found the cure, the only cure, the experimental method; the Eastern people did not find it, or did not fully understand it, or neglected to apply it.”⁸ In addition, he suggests

...perhaps, that the Eastern people, say the Muslims, had reached the limit of their development, that they were like those gifted children who startle the world by their precocious achievements and then suddenly stop and become less interesting, while others, at first less brilliant, pass far ahead of them.⁹

The decline thesis continued well into the twentieth century with slightly less absurd explanations. For example, in 1929, Sir William Cecil Dampier (1867-1952) strongly proclaims that by the close of the eleventh century “[t]he decline of Arabic and Muslim learning had set in, and henceforth science was chiefly a European activity.”¹⁰ In 1932, Max Meyerhof (1874-1945) suggests that Islamic science declined beginning from about 1100 because of the work of al-Ghazālī (d. 1111).¹¹

Questioning the Decline Theory

Aydin Sayili is perhaps the first scholar to devote an entire appendix to the causes of decline as well as seriously attempt to define ‘decline’ and explore possible causes.¹² Sayili defines the decline of Islamic science as a “decrease of dynamism in science” which

7. George Sarton, *History of Science* (New York: Krieger, 1927), 738.

8. Ibid., 29.

9. Ibid.

10. Sir William Cecil Dampier, *History of Science and its Relation with Philosophy and Religion* (Cambridge: Cambridge University Press, 1929), 76.

11. Max Meyerhof, “Science and Medicine” in *The Legacy of Islam*, eds. Sir Thomas Arnold and Alfred Guillaume (Oxford: The Clarendon Press, 1931), 337. Later in the same chapter, Meyerhof contradicts himself by stating the “twelfth century marks a standstill” (not a decline).

12. Aydin Sayili, “The causes of the decline of scientific work in Islam” in *The Observatory in Islam and its Place in the General History of the Observatory* (Ankara: Türk Tarih Kurumu Basimevi, 1960), Appendix II, 407-429.

does not mean a decrease in the amount of knowledge in circulation or available for circulation. It is a decline in the magnitude of scientific work and achievement, in scientific productivity, in the frequency of occurrences of original contributions to scientific knowledge...a gradual, if not uniform, decrease both in the intensity of production of first-rate work, and in the frequency of appearance of first-class scientists...who did not disappear during the later centuries, but they became increasingly rare.¹³

Sayili also recognizes that the decline “was not always conspicuous; at times it was not uniform and continuous, and it was not simultaneous or of equal magnitude in all scientific fields and geographical regions.”¹⁴ This marks a significant departure from previous scholarship.

In 1987, Abdelhamid Sabra continues to frame the fate of Islamic science in terms of decline but suggests that a decline occurred because the philosophers’ view of knowledge was replaced by the instrumentalist view proposed by al-Ghazālī. He also claims that the decline did not happen in the context of orthodox opposition (as is usually thought) but in the context of acceptance and assimilation. Decline set in “when the sciences came to be accepted and practiced only to the extent that they were legitimated by the instrumentalist view”.¹⁵ This suggestion, Sabra notes, is not intended as an explanation of the phenomenon of decline, but as a relevant and possibly illuminating observation that might help future research by directing our attention in a certain direction.¹⁶

It is interesting to note, however, that Sabra—like Sayili—rejects the notion of a general or uniform decline of Islamic science, as is characteristic of the decline theorists. Instead, he raises three fundamental issues: (1) assigning a date to decline is difficult because of problems in determining when it began and because the Islamic Empire covered a vast geographical area in which not all centers of scientific activity were in the same phase of development at the same time; (2) decline in one branch may coincide with progress in another; (3) much specific research is needed before reliable general conclusions are made. These are important remarks because though Sabra accepts that decline did in fact occur, he seems to reject the conventional theory that stipulates a general decline.¹⁷

13. *Ibid.*, 412-413.

14. *Ibid.*, 412.

15. *Ibid.*, 241.

16. *Ibid.*

17. *Ibid.*, 238-239.

This marks a return to proper scholarship, though it is unfortunate that Sabra shows no awareness of Ibn Khaldūn's observations (as elaborated upon later in this paper).

In 1992, David C. Lindberg states that Islamic science went into a decline during the thirteenth and fourteenth centuries and that by the fifteenth century little was left. He claims not enough research has been done to permit us to offer a satisfactory explanation for this decline, but offers several possible causal factors: outright opposition by conservative religious forces; the alteration of the character of scientific activity by the imposition of a very narrow definition of utility; and the disappearance of peace, prosperity and patronage, as a result of continuous, disastrous warfare among factions and petty states within Islam and attacks from without.¹⁸ Lindberg advances a handmaiden thesis for the cause of decline:

Science became naturalised in Islam—losing its alien quality and finally becoming Islamic science, instead of Greek science practiced on Islamic soil—by accepting a greatly restricted handmaiden role. This meant a loss of attention to many problems that had once seemed important...¹⁹

A year later, Toby Huff argues that the end of the thirteenth century marked the decline of Islamic science. He recognizes that there were significant scientific events after the thirteenth century but understands them as minor in comparison to what was taking place in Europe. He explains that, while research during the previous three decades advanced our understanding of Arabic science, it failed to explain the reasons for the decline. Huff offers, therefore, religious, legal, cultural, and institutional factors as possible causes of the decline.²⁰

In 1999, James E. McClellan III and Harold Dorn continue to repeat the decline theory, but recognize that scholars disagree on when the vitality of scientific activity started to decline. They also recognize, as Sabra did, that important new science continued to be done in the East until the fifteenth and sixteenth centuries. Despite this important observation, they continue to cling to the idea that Islamic science declined around the

18. David C. Lindberg, *The Beginning of Western Science: The European Scientific Tradition in Philosophical, Religious, and Institutional Contexts, 600 B.C. to A.D. 1450* (Chicago: The University Chicago Press, 1992), 180-182.

19. Ibid.

20. Toby E. Huff, *The Rise of Early Modern Science* (Cambridge: Cambridge University Press, 1993), n.l.

year 1000.²¹

George Saliba, on the other hand, rejects the idea that Islamic science suffered a uniform decline. Although he concedes some branches may have declined, he seeks answers to specifically “which science has declined, at what time, under what conditions, what political, economic, social reasons?” He also rejects common explanations for the supposed decline, including the claim that scientific inquiry ran afoul with Islamic religious authorities. He criticises as flawed, for example, the argument that al-Ghazālī is to blame for the decline of Islamic science based on the historical fact that scientists produced “the best mathematics, the best astronomy and the best medicine after al-Ghazali”. He argues that if some branches of Islamic science declined, it may have been the result of the industrial leap forward that Europe achieved, particularly after the discovery of the Americas. From that time onwards, the Islamic world seems to be in a race with Europe; not only did it fail to catch up, but the gap is ever widening.²²

In a 2003 publication, Sabra and Hogendijk argue that Islamic science flourished well beyond the eleventh century:

The Islamic tradition in the exact sciences continued well into the nineteenth century, and abundant source material is available in the form of unpublished manuscripts in Arabic, Persian, and other languages in libraries all over the world. In the last decades, many researchers have worked on the Islamic scientific tradition, and our views of this tradition are rapidly changing as a result of recent discoveries. This process will, hopefully, continue, because important sources have not been identified and studied.²³

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21. James E. McClellan III and Harold Dorn, *Science and Technology in World History* (Baltimore and London: The Johns Hopkins University Press, 1999), 113.
 22. George Saliba, “Arabic Science Historian George Saliba Rejects Common Explanations of Decline of Science in Islamic World”, Columbia News Video Brief, July 1, 2002. <http://www.colombia.edu/cu/news/media/02/georgesaliba/>. These arguments can also be found in: George Saliba’s *al-Fikr al-‘Arabi*, *op. cit.* pp.163-190.
 23. Jan P. Hogendijk and Abdelhamid Sabra, *op. cit.*, vii. This view is supported by modern research in the history of astronomy, medicine, and mathematics in Islam between the eleventh and sixteenth centuries. In astronomy, the work of George Saliba and others support this observation. See, for example, George Saliba, “Theory and Observation in Islamic Astronomy: The work of Ibn al-Shātir” in *Journal for the History of Astronomy* 18 (1987), 35-43; “Arabic

This reinforces Saliba's argument that the decline was not homogeneous, and that much specific research is needed before reliable general descriptions, let alone plausible explanations, can be made.

Ibn Khaldūn and the Rejection of the Decline Theory

Considered the greatest Arab historian and the father of modern social science and cultural history,²⁴ the North African philosopher-historian Ibn Khaldūn (1332-1406) wrote a world history that aimed at an analysis of historical events. Ibn Khaldūn's observations on the fate of Islamic science are significant today as they directly contradict the golden age/decline theory. They have also been neglected by the scholars of the field.

In a chapter titled "Scientific instruction is a craft," Ibn Khaldūn explains that scientific instruction in the lands of the Maghrib had practically ceased to be cultivated because the civilization of the Maghrib had disintegrated and its dynasties have lost their importance, and this resulted in the deterioration and disappearance of the crafts. Furthermore, when the civilization of Muslim Spain was highly developed and sedentary culture was well established the sciences and crafts were greatly cultivated and very much in demand. When they fell into ruin, however, scientific instructions ceased to be cultivated. The emphasis here is on scientific instruction—or the education of science—not necessarily its activity.²⁵ Emphasis on scientific activity is found in another chapter, where Ibn Khaldūn states "Scientific activity disappeared there [the Maghrib and Spain], save for a few remnants that may be found among scattered individuals and that are controlled by the orthodox religious scholars."²⁶

Ibn Khaldūn explains that with the exception of Baghdad, al-Baṣrah and al-Kūfah, which fell into ruin, the tradition of scientific instruction *did not* decrease nor cease to be cultivated in the Eastern part of the Empire:

Planetary Theories after the eleventh century AD" in *Encyclopedia of The History of Arabic Science* 1 (1996), 58-127. In mathematics, see J. Lennart Berggren, "Mathematics and Her Sisters in Medieval Islam: A Selective Review of Works done from 1985 to 1995" in *Historica Mathematica* 24 (1997); Ahmad Djebbar, "On Mathematical Activity in North Africa since the 9th century" in *AMUCHMA Newsletter* 15 (1995), 3-24. In medicine see for example Emilie Savage-Smith, "Medicine" in *Encyclopedia of the History of Arabic Science* 3 (1996), 930.

24. Mushin Mahdi, *Ibn Khaldun's Philosophy of History* (Chicago: University of Chicago Press, 1971).

25. Ibn Khaldūn, trans. Franz Rosenthal, Vol. 2, 426.

26. *Ibid.*, Vol. 3, 117.

This may be exemplified by our previous statements concerning Baghdad, Córdoba [Spain], al-Qayrawān [the Maghrib], al-Basra and al-Kufa. At the beginning of Islam, the civilizations (population) were large, and sedentary culture existed in them. The sciences were then greatly cultivated there, and the people were widely versed in the various technical terminologies of scientific instruction, in the different kinds of sciences, and in posing problems and (inventing new) disciplines. They exceeded (all) who had come before them and surpassed (all) who came after. But when the civilization of those cities decreased and their inhabitants were dispersed, the picture was completely reversed. Science and scientific instruction no longer existed in those cities, but were transplanted to other Muslim cities. We, at this time, notice that science and scientific instructions exist in Cairo in Egypt, because the civilization of (Egypt) is greatly developed and its sedentary culture has been well established for thousands of years. Therefore, the crafts are firmly established there and exist in many varieties. One of them is scientific instruction.²⁷

Overall, Ibn Khaldūn suggests three distinct observations: (1) science and scientific instruction decreased and eventually disappeared or ceased to be cultivated in the Maghrib and Spain simply because these countries were ruined; (2) science and scientific instruction in Baghdad, al-Basra, and al-Kufa no longer existed at any significant scale, and were transplanted to other regions of Islam; (3) science and scientific instruction existed in other Muslim lands like Egypt at a time when they ceased in certain places and were transplanted in others.

These observations are multi-faceted and signify that, at least between the so-called golden age and the fourteenth century, Islamic science did not decline. This is in direct contradiction to the conventional decline theory. One would expect that any scholarly discourse on the fate of Islamic science after the “golden age” would show awareness of Ibn Khaldūn’s observations, and build upon them to provide a more comprehensive answer for the fate of Islamic science. Instead, Ibn Khaldūn’s observations remained unnoticed except, as will be demonstrated next, in the work of two scholars—Gustave von Grunebaum and Ahmad Y. Al-Hassan—who nonetheless failed to represent Ibn Khaldūn accurately.

The Failure of Von Grunebaum and Al-Hassan

While Von Grunebaum recognises that Islamic civilization made inventions,

27. Ibid., Vol. 2, 343.

discoveries, and improvements, he mistakenly argues that:

Conservatism... and the tendency natural to despotism and orthodoxy to discharge revision and reform, combined with Islam's catholic curiosity and receptiveness, are responsible for that lack of integration of the component elements which makes Islamic civilisation look like a torso... arrested in its growth during the eleventh century... It stagnated in self-inflicted sterility.²⁸

Additionally, and of importance, while Von Grunebaum shows awareness of Ibn Khaldūn's observations, he is mistaken in his claim that Ibn Khaldūn observed:

...With the extinction of scientific knowledge, civilisation had perished throughout the Muslim West. Only faint traces of scientific erudition remain, and its representatives are forced to evade the surveillance of the orthodox doctors. In southern Persia and Transoxania, also in Egypt, the situation is slightly more encouraging.²⁹

Departing from the idea that Islamic science declined after the eleventh century, Ahmad Y. al-Hassan exclusively deals with the factors that led to a decline *after* the sixteenth century. While asserting that Islamic science maintained its leadership between the eighth and the twelfth centuries, he argues that it also flourished between the thirteenth and the sixteenth centuries, and maintained its lead, especially in the countries of eastern Islam. To illustrate this, al-Hassan discusses briefly the case of the observatory in Islam between the thirteenth and the sixteenth centuries. The Maragha observatory, he explains, was established in 1259 and continued in operation until about 1304. It contained 400,000 books and a good number of distinguished scientists led by the famous Naṣīr al-Dīn al-Ṭūsī, whose team included leading scientists as Quṭb al-Dīn al-Shīrāzī, Muḥayyid al-Dīn al-ʿUrḍī, Muḥayī al-Dīn al-Maghribī and many others. The observatory was an institution of research in astronomy and a scientific academy with excellent opportunities for scientific contact and exchange of ideas. Al-Hassan advocates, with clear evidence, the case that Islamic achievements in science extended until the middle of the sixteenth century.³⁰ Al-Hassan shows awareness of Ibn Khaldūn's observations:

28. G. E. von Grunebaum, *Medieval Islam: A Study in Cultural Orientation* (Chicago: University of Chicago Press, 1946), 322.

29. *Ibid.*, 339.

30. Ahmad Y. Al-Hassan, "Factors behind the Decline of Islamic Science

At the time when scientific communities in Europe were on the increase, all the regions of Islam were witnessing the decline of science and of scientific communities. This phenomena [sic] is discussed by Ibn Khaldūn in more than one chapter in his *Introduction (al-Muqaddimah)*.³¹

His representation of Ibn Khaldūn's observations is, however, problematic. Al-Hassan claims that Ibn Khaldūn mentions that *all regions of Islam* witnessed decline in more than one chapter of his *Muqaddimah* and that he "discusses the factors which are essential for the flourishing of sciences and other professions and the factors which lead to their decline."³² Ibn Khaldūn, however, does not discuss factors that lead to decline, although in some contexts he uses terms (such as decrease), which could be understood as referring to a local decline. On the other hand, Ibn Khaldūn clearly states that different fates awaited Islamic science in different regions at different times.

Conclusion

This paper advanced the argument that the decline theory is a scholarly error that has proven to be remarkably persistent despite the availability of contrary evidence and the attention of ever-growing numbers of concerned scholars. In the absence of an alternative the decline theory acquired the status of a paradigm, an analytical model that achieved currency even though it did not satisfy all the facts. A thoughtful reading of Ibn Khaldūn's work would have forced rejection, or at least alteration, of the much-touted decline theory. Based on substantial findings, scholars like Saliba and Sabra have rejected the basic claims of the decline theory.

There is a growing body of evidence which confirms the rise, rather than the decline, of science in the Muslim world after the eleventh century. It is surprising that such a fundamental and obvious feature of Islamic science should have remained obscure and escaped the attention of so many decline theorists. Given the presence of contrary evidence, the persistence of this theory clearly demonstrates that, until recently, scholars traveled great distance in the academic realm dispensing such mock scholarship without encountering any serious impediments.

after the Sixteenth Century" in *Islam and the Challenge of Modernity: Historical and Contemporary Contexts*, ed. Sharifah Shifa Al-Attas, (Kuala Lumpur: International Institute of Islamic Thought and Civilisation, 1996).

31. Ibid., 355.

32. Ibid.