DEĞERLENDİRME / REVIEW ARTICLE

The Almighty Akçe: The Economics of Scholarship and Science in the Early Modern Ottoman Empire

Review of *Science without Leisure: Practical Naturalism in Istanbul, 1660-1732* by Harun Küçük

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Is it possible for science to exist without theory? This basic question animates Harun Küçük's new book, *Science without Leisure*. For Küçük, the answer is no, and the Ottoman Empire provides an instructive example of what happens when scientific practice exists in a vacuum of theory. Putting a new twist on some of the familiar narratives regarding science in the Ottoman Empire during the seventeenth and eighteenth centuries, Küçük argues that many Ottoman subjects practiced the natural sciences but the missing ingredient was theory. This lack of theory in turn emerged because the scholars in the madrasa were being paid too little. They lacked the "leisure" afforded by affluence to devote themselves to theory and thus became ignorant, law-obsessed, and, ultimately, insignificant. In this moment of intellectual and economic decline, the earlier tradition of Islamic science was pushed aside by new "practical naturalists," who came to dominate the social field of science. Yet, the practical naturalism of the Ottomans never came to resemble modern, or rather early modern, science in Europe because it lacked a connection to theory.

Science without Leisure is the first substantive new monograph in decades to attempt to craft a cohesive narrative of Ottoman science in the early modern period.[1] It joins a number of recent and important works on the history of science

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I would like thank my many colleagues in both Ottoman history and the history of science who were kind enough to read over this essay, honing its arguments and tempering its criticisms.

1 The founding narrative in the field is Abdülhak Adnan Adıvar, *La science chez les Turcs ottomans* (Paris: G.-P. Maisonneuve, 1939); It was expanded and revised for the Turkish

in the premodern Middle East that situate science in everyday practices and local contexts rather than the history of ideas or idealized narratives of Muslim genius.[2] Küçük, a self-declared outsider and "Europeanist" (230) venturing into the field of Ottoman history, is not only applying the insights of the field of history of science to the Ottoman Empire, but also turning the Ottoman Empire into a space of theorization for the history of science as a whole by raising a set of ambitious, provocative, and timely questions. What was the economy of scholarship and learning in the premodern Islamic world? How did the exigencies of the market or the state bureaucracy shape scientific production? What precisely is the value of theory in science and what fosters theory's growth? How was the classical tradition of Islamic scientific theory integrated or discarded in later centuries? And can we speak of intellectual decline in objective terms? As the wide scope of these questions suggest, Küçük's book is actually three expansive arguments, each worthy of a separate monograph, crammed onto the pages of a single book: the first argues for the decline of the madrasa, the second proposes the phenomenon of practical naturalism in the Ottoman Empire, and the third, though largely unexplored, deals with the relationship between theory and practice in science. With a clear voice and characteristic aplomb, Küçük pushes, prods, and provokes historians of the Ottoman Empire to reconsider its scientific past.

Küçük's book might leave many of its readers feeling not only provoked but also exasperated. Once one ventures past the compellingly written introduction and conclusion, the answers Küçük provides often fall flat. The book's ambitious arguments demand the detailed work of a social historian and the deep intellectual contextualization of a cultural historian, but both are often lacking. Küçük admirably mines the secondary literature in Turkish, drawing on works from the 1960s to 1980s for many of his examples, quotes, and factoids, but he does not deeply engage with much of the past thirty years of historical scholarship on the Ottoman

version, *Osmanlı Türklerinde İlim* (Istanbul: Maarif Matbaasi, 1943); In recent years, there have been bibliographic overviews and thematic explorations but not a diachronic, cohesive narrative of Ottoman science. See Miri Shefer-Mossensohn, *Science among the Ottomans: The Cultural Creation & Exchange of Knowledge* (Austin, Tex.: University of Texas Press, 2015); Avner Ben-Zaken, *Cross-Cultural Scientific Exchanges in the Eastern Mediterranean, 1560-1660* (Baltimore: Johns Hopkins University Press, 2010).

2 See, for example, Ahmed Ragab, *The Medieval Islamic Hospital: Medicine, Religion, and Charity* (New York: Cambridge University Press, 2015); Daniel Stolz, *The Lighthouse and the Observatory: Islam, Science, and Empire in Late Ottoman Egypt* (Cambridge: Cambridge University Press, 2018).

Empire. Nor does he introduce many new primary sources beyond the commonly referenced episodes of Ottoman science, and the few new sources he does bring to the reader's attention are marginal to his arguments and treated glibly (e.g. 208-209). Arguments are often based on loose readings of texts and interpretive elisions.[3] Especially in later chapters, the evidence is particularly thin. The sixth chapter on how the elite disregarded practical naturalism through a process of "distinction" consists of little more than a few lines from the poet Nābī and a long tangent about Yanyālı Es'ad Efendi's translation of Cottunius. Küçük often prefers to argue through association and conjecture, pulling out long chains of sometimes quite tenuous connections that are meant to contextualize the protagonists but rarely reveal much, like the extended excursus about Christoph Eberhard and Johann Friedrich Bachstrom (209-216) that occupies more than half of a chapter ostensibly about the intersection of empirical knowledge and natural philosophy in Ibrāhīm Müteferriḳa's work on magnetism. And then there is the strong proclivity for grand declarations and extended asides—for example, about the republican character of Ottoman science (51), the role of melancholy and hypochondria and its Jewish character (150-152), or the role of reform and renewal (*tecdīd*) in the process of social distinction (170). The book's arguments come to resemble a house of cards: elaborate constructions on very shaky foundations.

In addition, it has to be noted that Küçük repeatedly flouts the standard practices of professional historians, something that bothered even this sympathetic reviewer. For a monograph on a topic that has hardly been studied, the footnotes are meager. Many, if not most, of the factual statements—e.g. that Sultan Ahmed III had 30,000 people executed in the palace in his first decade in power (37, 169),

3 Take, for example, Küçük's statement that Sultan Murad III (r. 1574-1595) ordered that only "Muslims" with "a degree in medicine from one of the imperial hospitals or medical medreses" could practice medicine in Istanbul (161). The imperial order that Küçük provides, however, says nothing about such institutions of learning, but speaks only about people who "have not themselves studied medicine under skilled physicians," which is an interpretive leap given that the sciences were often taught informally in private study circles. Küçük claims elsewhere that the chief physician (*ḥekīmbāşı*) oversaw the teaching in the medical madrasas and ratified the students' diplomas (68). While the chief physician was in charge of filling appointments in imperial and palace hospitals, none of the secondary sources Küçük cites mention that he had control of the curriculum or that there was a formal license given upon graduation. See Ali Haydar Bayat, *Osmanlı Devleti'nde Hekimbaşılık Kurumu ve Hekimbaşılar* (Ankara: Atatürk Kültür Merkezi Başkanlığı, 1999), 7-8.

or that he made it a requirement that madrasa professors come from good families (172), or that the sultans shut down Armenian printing presses (197), or that professors' salaries in Paris were raised around 1720 (193), or that it was common practice in early seventeenth-century almanacs to skip a year (109, 134)—are not referenced. Even some direct quotes are not given citations (80, 185, 199, 208, 209). Every monograph contains a missing footnote or three, especially when written under pressure, but Küçük's fast and loose approach to evidence only manages to raise readers' suspicions. Sometimes, as noted below, it is challenging to find any support for his claims in both primary and secondary sources. Regardless of the ultimate accuracy of these quotes and statements, it is difficult to treat his conclusions about Ottoman science as any more than speculation at best.

The flaws of the book are unfortunate because *Science without Leisure* has some important lessons for historians nonetheless. Küçük's emphasis on the practical nature of science in the Ottoman Empire while insisting on the continued centrality of theoretical thinking to science provides a useful correction for both historians of Ottoman/Islamic science and the larger field of history of science. Küçük asks readers to treat his book as a methodological argument (xiv) and not just focus on its specific content. In that spirit, the review draws out the novelty of the book's framing, especially in the book's relatively meatier first half, and poses some challenges where this framing falls short. Although there are many specific points to which to object, ultimately one particular fault runs through the entire work: Küçük projects the modern, Western university system—with its particular economics of scholarship and its monopolization of knowledge—onto the Ottoman intellectual landscape. Like all good historians, Küçük uses the concerns of the present to inspire and guide his analysis, though ultimately this framing misleads readers as to the nature of science in the Ottoman Empire.

Theory and Science

It might surprise some readers to know that many professional historians of science today rarely write traditional histories of ideas or even tackle canonical thinkers like Newton, Leibniz, or Descartes. For the past few decades, they have instead focused on the *practices* that constituted the systematic study of nature, i.e. science. The intellectual work of science is revealed not in the ideas of grand thinkers pontificating in splendid silence, but in the small, quotidian actions of its practitioners as they tinkered with instruments, smelted metals, and sold exotic

materia medica. Often, the larger ideas that animated these practices are implicit, found embodied in the very objects used, created, or exchanged. Moreover, the protagonists in this recent scholarship are not scholars or philosophers, but more humble artisans or merchants, collectively constructing knowledge through their individual experimentation.[4] In this sense, practice also entails modes of description, record keeping, and observation, not just physical labor.[5] As a result of these changes, big thinkers, like Francis Bacon, who were previously considered foundational figures in the history of early modern science, are now regarded to be of minor importance, whose work largely entailed the cooption and repackaging of the scientific labor of artisans.[6]

Küçük knows this approach well and puts it to good use in his fourth chapter on astronomy. Here he focuses on the work of Teẕkireci Ibrāhīm, a minor figure who is best known for writing, sometime between 1660 and 1664, the first Ottoman or Islamic text to mention the heliocentric Copernican models of the heavens found in contemporary European science through a translation of Noel Durret's astronomical tables.[7] In particular, Teẕkireci Ibrāhīm's work was labelled as innovative thanks to the diagrams depicting a heliocentric model of the heavens in one manuscript copy of his work. Küçük, however, dispenses with the image of Teẕkireci Ibrāhīm as an astronomical pioneer and situates him instead in the more mundane world of tax collection: Teẕkireci Ibrāhīm was a mid-level bureaucrat who was interested in the translated tables of astronomical observation to help with the calculations of the solar year, upon which taxes were based. The diagrams of a heliocentric model of the heavens were a later addition by an

4 See, for example, Pamela Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2004); Harold Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven: Yale University Press, 2009).

5 See, for example, Brian Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago: University of Chicago Press, 2006); Lorraine Daston and Elizabeth Lunbeck, *Histories of Scientific Observation* (Chicago: University of Chicago Press, 2011); Ann Blair, *Too Much to Know: Managing Scholarly Information before the Modern Age* (New Haven: Yale University Press, 2010).

6 Deborah Harkness, *The Jewel House: Elizabethan London and the Scientific Revolution* (New Haven: Yale University Press, 2007).

7 İhsanoğlu Ekmeleddin, "Introduction of Western Science to the Ottoman World: A Case Study of Modern Astronomy (1660-1860)," in *Transfer of Modern Science and Technology to the Muslim World*, ed. İhsanoğlu Ekmeleddin (Istanbul: IRCICA, 1992), 69-74.

unknown reader according to Küçük (111) (though without providing definitive proof). Küçük also casts Teẕkireci Ibrāhīm as scholarly naïf, largely unfamiliar with the learned tradition of Islamic astronomy (114). Küçük thus focuses on the daily practices and contexts in which astronomy flourished and in doing so recasts astronomy in the Ottoman Empire as a minor, technical field in the service of the bureaucracy, rather than a cosmological lynchpin of human society that twentieth-century scholars have made it out to be. In another chapter, Küçük, less successfully, resituates the story of "new medicine (*ṭibb-i cedīd*)" in the Ottoman Empire by focusing on the medical marketplace of drugs and *materia medica* in seventeenth-century Istanbul rather than grand transformations of thought. The humble medicinal recipe becomes the meeting point for new ideas about scientific practice and authority.

These less learned practitioners, whom Küçük calls "practical naturalists," were the true protagonists of Ottoman science. Practical naturalism is "neither quite artisanal knowledge nor quite applied science, nor yet popular science" (4). Its ends were practical and immediate rather than the immaterial and uncertain pursuit of knowledge for its own sake. Unlike other recent works in history of science, most of Küçük's practical naturalists are not actually artisans or merchants toiling in the streets of Istanbul, but relatively elite bureaucrats or doctors, who were very close to the Porte but whose intellectual formation came from outside the madrasa. These figures are exemplified in Küçük's profile of Yirmisekiz Meḥmed Çelebi, better known for the embassy he led to France in 1720. Yirmisekiz Meḥmed was the son of a Janissary officer who, thanks to some powerful connections, rose quickly through government service. Among his many duties was oversight of the imperial mint, just the type of technological expertise that anchored practical naturalism. When he set out for Louis XV's France, he displayed particular interest in these practical applications of science: hydraulics, printing, minting, and mapmaking.

Most historians would have been happy to leave the story at that, highlighting a current within Ottoman science that plied not in the grand theories of even grander scholars but in everyday forms of scientific practice. Küçük, however, has greater ambitions. For Küçük, historians' overemphasis on practice has actually effaced the importance of theory in science (29).[8] Küçük never quite elaborates

8 Matthew Jones makes a similar point at the end of his review of Harold Cook's *Matters of Exchange*. "Matters of Fact," *Modern Intellectual History* 7, no. 3 (2010): 642.

precisely what work theory does in science, but the frequent refrains to Newton and other major early modern European figures indicate that he believes that these thinkers are still quite central to the history of science. Importantly, Küçük defines theory in quite specific terms: It is not just any act of generalizing from particulars, but the Aristotelian tradition of discussing the functioning of human and natural matters abstractly, what he refers to as "Greek categories of natural knowledge; that is, theory" (6, 83). This particular form of thought was famously translated from Greek and Syriac into Arabic during the ninth and tenth centuries and elaborated in Arabic by scholars in the ensuing centuries. In the late medieval period, it was eventually translated into Latin and found its way into Latinate Europe, forming one of the intellectual bases for early modern science.

These "Greek categories and genres," however, were largely missing in the Ottoman Empire, according to Küçük. Using the multi-volume bibliographic catalogs of Ottoman scientific texts edited by Ekmeleddin İhsanoğlu, he points out that there are very few scientific theoretical texts (40-48).[9] While there are many writings about astronomical instruments or medicinal recipes or the like, there seem to have been hardly any theoretical texts on science written during this period. Historians generally frown upon building an argument from a seeming "lack," but Küçük's observation is generally true within his carefully chosen parameters. There are no readily identifiable, major theoretical texts on the natural sciences written in Istanbul during the early modern period, whether as new texts or commentaries.[10] While there might be a volume or two by some minor author, waiting to be discovered in a manuscript library, we do not have texts that became canonical and central, comparable to the works of Avicenna/Ibn Sīnā (d. 1037) or Nāṣir al-Dīn al-Ṭūsī (d. 1274).

This is an important observation on the part of Küçük and sets up the major premise of his book. Both Europe and the Middle East had access to the Aristotelian theoretical traditions and were societies in which practical naturalism flourished. Why, then, did Europe end up with modern, or at least early modern, science, but the Ottoman Empire did not? By phrasing the question in this

9 For example, Ekmeleddin İhsanoğlu, ed., *Osmanlı Astronomi Literatürü Tarihi*, 2 vols. (Istanbul: IRCICA, 1997).

10 See, for example, Robert Wisnovsky, "The Nature and Scope of Arabic Philosophical Commentary in Post-Classical (ca. 1100-1900 AD) Islamic Intellectual History: Some Preliminary Observations," *Bulletin of the Institute of Classical Studies, Supplement*, no. 83 (2004): 149-91.

manner, Küçük has set up a clever historical experiment and offers a spin on that bugbear of historians: "why Europe?" It is also a way of revisiting the so-called Needham question, i.e. why did the Scientific Revolution occur in Europe and not in China (or in the Middle East), given that all these civilizations had flourishing scientific cultures? Some historians might shy away from such large questions, wary of the common resort to cultural difference as explanation, but Küçük forges on ahead and forces historians to confront some uncomfortable truths. In recent years, there has been a concerted push, alternately called decolonization or global (early) modernity, to recognize the scientific traditions and practices of non-Western cultures and to understand their centrality in the narrative of Western scientific modernity.[11] As many scholars now argue, we should not make the theoreticized, mathematicised science of Descartes and Newton the standard against which to judge the world's sciences and instead focus on recognizing the many local practices which might fall under our rubric of science.[12] On one hand, Küçük agrees that we can find examples of scientific practice flourishing in every corner of the early modern world. On the other hand, Küçük asks us to consider the possibility that not all the world's premodern scientific traditions were equal. There was something that set Europe apart—the continued cultivation of theory and the pursuit of knowledge for its own sake. As Küçük puts it, Europe remained stodgily medieval in its attachment to Aristotle while the rest of the world zoomed on ahead to a practical modernity (224).

Küçük's pointed choice not to narrate the Ottoman experience as part of a global scientific revolution is the most refreshing aspect of this book. As Küçük notes, the field of history of science is at an "impasse" between wanting to "redistribute scientific credit to include as much of the world as possible" and an inability to let go of the idea that "there was something unique about European science" (229-230). Küçük should be applauded for searching for new visions of

11 Although sometimes forgotten, the discipline of the history of science has always possessed a desire to write an inclusive and global historical narrative. It is worth noting that Aydın Sayılı, a Turkish scholar who would write about astronomy in the Islamic world, was the first graduate, in 1942, from the first formal history of science program (George Sarton's program at Harvard University).

12 See, for example, Kapil Raj, "Thinking without the Scientific Revolution: Global Interactions and the Construction of Knowledge," *Journal of Early Modern History* 21 (2017): 445-58; Clapperton Chakanetsa Mavhunga, "Introduction," in *What Do Science, Technology, and Innovation Mean from Africa?*, ed. Clapperton Chakanetsa Mavhunga (Cambridge: The MIT Press, 2017).

the history of science rather than rehashing the same old narratives and further perpetuating the impasse.

Declining Fortunes

Why then did scholars in Ottoman Istanbul not write scientific theory? Küçük's answer is unapologetically materialist: madrasa scholars were simply not paid enough and thus could not afford the luxury to theorize. The fact that professorial salaries were much higher in early modern Europe is the *deus ex machina* in the story of the emergence of (early) modern science. Historians of science have long taken into account the role of wealth, especially as it translates into social status, in lending credibility to scientists and natural philosophers.[13] Küçük's focus on professorial salaries, however, is so straightforward and radical that it is hard to even call it Marxist. It's all about the money.

The problems for the Ottomans started with the severe currency debasements and the continued rise of real prices starting in the late sixteenth century. Professors in the madrasa, however, were appointed in hierarchies of rank tied to their nominal salary; e.g. an entry level professor was at the twenty-asper or *akçe* rank, whereas the highest professor was at the fifty or sixty-asper rank. Because salaries were paid from the proceeds of endowments, they were relatively inflexible. Faced with a declining currency and rising prices, yet unable to raise their salaries, professors found themselves increasingly impoverished. Küçük here raises a point that has not been properly considered before. Was a daily salary of, say, 30 aspers enough for a professor? Would it have provided him enough to subsist on, much less support a family? In one particularly waggish example, Küçük first uses Şevket Pamuk's historical price indices to calculate that with a sixty-*akçe* daily salary a professor could buy thirty pounds of flour. Küçük then goes to Walmart.com to convert the flour into American dollars, declaring that a top physician's daily salary was the equivalent of $15 today (89). The conversion is, of course, downright facetious and purposefully provocative, but it serves to highlight Küçük's oft-repeated contention that even the highest-level madrasa professors were paid "starvation wages" (17, 88, 93, 144, 158). Whereas in the salad days of the sixteenth century, prior to the currency debasements, madrasas were hotbeds of theorization in the sciences, in the seventeenth century, the madrasa became more limited in scope, where only small-minded scholars focused on law and theology.

13 See, for example, Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994).

With this argument, Küçük contributes to a minor countercurrent in the recent historiography of both Ottoman and Islamic studies that is willing to acknowledge a tangible decline in certain aspects of early modern Islamic societies. Older versions of this theory tend to argue for the decline of grand objects like the Ottoman state or Islam or the economy and, in the rare case that they identified one particular cause, often pinned the blame on a general mentality or culture that kept Middle Eastern societies from developing or adapting to Western modernity.[14] Not surprisingly, the culprit was usually an excess of religion, i.e. Islam. Within Ottoman historiography, a decline paradigm took shape by idealizing the institutions of the sixteenth-century state, when the empire was at the peak of its military power, in contrast to the perceived decadence of the ensuing centuries. In response to these claims, historians over the past forty years have conducted deeply researched studies that demonstrate that, rather than failing, these institutions systemically transformed and adopted to new conditions. Today, the idea that the Ottomans did not decline has become such a common refrain that it is repeated like a mantra in almost every book on the subject.

Newer visions of Ottoman decline, like Küçük's, focus on specific institutions and anchor the decline not in the realm of culture but in the material (xiv, 16), such as the environment or the economy.[15] In particular, Küçük does two new things with his version of decline. First, he reorients the discussion to the effects of increased prices and currency debasement not on the fortunes of the Ottoman state or the economy, as most studies have done, but on the lives of individuals.[16] Responding to arguments that the changes of seventeenth century were not decline but structural transformation, Küçük states "If you asked a professor whose purchasing power was reduced to one-tenth of what it used

14 Toby E. Huff, *The Rise of Early Modern Science: Islam, China, and the West*, 2nd ed. (Cambridge: Cambridge University Press, 2003); Timur Kuran, *The Long Divergence How Islamic Law Held Back the Middle East* (Princeton: Princeton University Press, 2011); Bernard Lewis, *The Muslim Discovery of Europe* (New York: W.W. Norton, 1982).

15 See, for example, Sam White, *The Climate of Rebellion in the Early Modern Ottoman Empire* (Cambridge: Cambridge University Press, 2011).

16 Cemal Kafadar, "When Coins Turned into Drops of Dew and Bankers Became Robbers of Shadows: The Boundaries of Ottoman Economic Imagination at the End of the Sixteenth Century" (Ph.D. Dissertation, Montreal, McGill University, 1986); Linda T. Darling, *Revenue-Raising and Legitimacy: Tax Collection and Finance Administration in the Ottoman Empire, 1560-1660* (Leiden: Brill, 1996); Şevket Pamuk, *A Monetary History of the Ottoman Empire* (Cambridge: Cambridge University Press, 2000).

to be, he would not say that he had undergone a transformation" (16). In this sense, he is right; there is surprisingly little literature as to how Ottoman subjects personally fared during the late sixteenth and seventeenth centuries, other than offhand mentions that urban consumers were squeezed by high prices.[17] It is important to note, though, that real prices were quite stable after 1600 and that food prices declined significantly by the end of the seventeenth century.[18] As Şevket Pamuk explains, "by 1700 [food prices] were only 20 percent higher than their levels in 1489-90."[19] This period of relative economic stability for urban consumers (which accompanied the end of the *akçe* as a minted, physical coin by the 1640s) continued until the late eighteenth century. In other words, only the initial decades of the seventeenth century witnessed radical economic instability for Ottoman subjects.

Küçük's main focus, however, is the intellectual repercussions of these economic transformations, which in his view amounted to the collapse of the entire edifice of Islamic learning and thought, at least, in its scientific vein. The madrasa, presumably unable to attract true scholars, became the abode of provincial ignoramuses who were only interested in studying law and theology and the madrasa education lost its social stature. Science was conducted only by the practical naturalists of Istanbul, who were more interested in making money than theorizing.[20] When these practical naturalists wrote scientific works, they had little or no access to the theoretical literature of past scholars. Their own literature was mired in the practicalities of their craft; they scribbled down medicinal recipes but ignored the larger workings of the human body, they used astronomy to make tax calendars but ignored the cosmology of the solar system. They took in whatever knowledge and ideas were at hand, not paying attention to whether it was native or imported from Europe. As Küçük repeatedly stresses, the discoveries of practical naturalists could never impact or interact with the theoretical studies of earlier Islamic scholarship, however, because madrasa scholars were not paid enough (e.g.172). Instead, the practical naturalists took over the "social field" of science from the madrasa-trained

17 Pamuk, *A Monetary History*, 129.

18 Pamuk, 120-25.

19 Pamuk, 124.

20 Küçük's narrative mirrors the traditional story about the decline/transformation of the Janissaries, who reacted to their diminished salaries by integrating themselves into the artisanal economy and sporadically rebelling. An elite component of the army became tied to petty occupations, swollen with fake members on the payroll, and unable to mobilize militarily.

scholars over the course of the seventeenth and eighteenth centuries, and despite some initial resistance, were increasingly accepted.

Küçük's argument retraces the path of earlier narratives of Ottoman science in which a new, modern science, often inspired by European ideas, took root on the ground once occupied by the decadent tradition of Islamic science. Many of the main characters and texts Küçük's book are the same as well: Teẕkireci Ibrāhīm and his heliocentric astronomical table; Ibn Sallūm and his new iatrochemical medicine; Ibrāhīm Müteferriḳa and his printing press; and Yirmisekiz Meḥmed and his embassy to France in 1720. Küçük tries to preempt any anticipated objections by emphasizing three important points. First, the new science of practical naturalism emerged organically from Ottoman society itself rather than being imported from Europe via Westernization. Second, the cause of the decline was not the inability of tradition to cope with inevitable modernity, but a contingent economic choice by the part of the Ottoman government not to pay madrasa scholars enough. In this way, Küçük flips the traditional equation that the Ottoman Empire did not develop modern science because it was too religious; the economic abandonment of science led to madrasas becoming centers of religion. Finally, Küçük argues that, despite its vivacity, Ottoman practical naturalism was not equivalent to early modern European science because it lacked theory.

Küçük's arguments, with their not-so-distant echoes of earlier paradigms of decline and secularization, take aim at recent narratives that argue that the Islamic world witnessed continued intellectual vitality until the early nineteenth century.[21] Like other recent books in the field, Küçük rightfully challenges the assumption that an Islamic scientific tradition existed as a set of texts, thinkers, and ideas that were always present and available to any Muslim throughout time and place, progressively accumulating more knowledge with every generation.[22] Küçük takes this view to the other extreme, however, arguing that past traditions of Islamic scientific learning essentially collapsed or disappeared, and that madrasa scholars were parochial and practical naturalists were profoundly ignorant. (This line of thinking also conveniently frees him from the obligation of taking into

21 Khaled el-Rouayheb, *Islamic Intellectual History in the Seventeenth Century: Scholarly Currents in the Ottoman Empire and the Maghreb* (New York: Cambridge University Press, 2015).

22 Ahmed El Shamsy, *Rediscovering the Islamic Classics: How Editors and Print Culture Transformed an Intellectual Tradition* (Princeton: Princeton University Press, 2020).

consideration texts in Arabic, which remained the language of science and philosophy.) Those scholars who did make appeals to past tradition did so more as a sclerotic attempt to come to terms with a new world around them (139). It often seems that Küçük is actually taking aim at a contemporary Turkish discourse that has lionized the Islamic aspect of Ottoman history. In place of genteel, erudite, and pious scholars dutifully building on the discoveries of past luminaries, Küçük delights in highlighting that his practical naturalists were a cosmopolitan group of impious Muslims, opportunistic converts, and renegade Christians and who wrote in Turkish and read Latin or French, largely bypassing the Arabic-language patrimony of the past.

Much of the rhetorical force of Küçük's argument for economic and intellectual decline comes from its resonance with our present circumstances. If the question, "Is America in decline?" was open for debate in the late 1990s, then the answer seems much clearer now in the 2020s.[23] This is particularly the case with the state of universities today, to which Küçük makes frequent allusions and comparisons (e.g. 74, 106, 172, 231). In the plump times of the sixteenth century, completing a madrasa was like attending a state college in early twentieth-century America (57), a sure path to social status and economic stability, and scholars could teach and write about the sciences at their own leisure. In the seventeenth century, however, there were far more students than there were professorships. And yet, the Ottomans continued to build and support madrasas until there were hundreds of them in Istanbul alone, spitting out thousands of students a year onto a job market that was not only saturated but poorly renumerated.

There is a good amount of truth to Küçük's comparisons. We *are* living through a change in intellectual values in which humanistic forms of learning and writing are increasingly marginalized. Not only are students pressured to choose more "practical" disciplines, but scholars themselves are evaluated by economically inspired metrics of productivity, leaving difficult but fruitful ideas to wither on the vine. Given these seeming parallels, it is hard not to agree with Küçük's assessment of the Ottoman academic world. Yet, the comparison to the present also leads readers astray, and once one moves beyond Küçük's admirable framing, the details do not always add up.

23 Cemal Kafadar, "The Question of Ottoman Decline," *Harvard Middle Eastern and Islamic Review* 4, no. 1-2 (1997-1998): 30.

The Economy of Scholarship

Science without Leisure is a book about science and leisure but it is never quite clear how the two interact. After the introduction, the idea of leisure does not pop up much at all. It would be more accurate to say that affluence rather than leisure is Küçük's true focus. The book's central claim is that professors (*mudarrisīn [Ar.] / müderrisler [Tr.]*) in the madrasa became impoverished due to the diminished buying power of their inflexible salaries starting in the late sixteenth century, which in turn lowered their social standing, turning them into mediocre scholars uninterested in the Islamic tradition of science, and leaving the social field of science to be taken over by others. Money, in other words, can grant scholars three things: economic stability, time, and social prestige.

Were Ottoman professors so poor in the seventeenth and eighteenth centuries, however? Did their salaries not simply rise with inflation, as was the case with other functionaries? The evidence Küçük presents is thin. He might have provided the reader some solid social history, perhaps incorporating a bit of prosopography, an analysis of the madrasa appointment records (still held in both digitized and paper format in the İstanbul Müftülüğü), or the mosque endowment financial records, or even incorporating some professors' or students' diaries.[24] Küçük's main piece of evidence, however, is a dogged insistence that professors were appointed to positions at certain salary scales and that this could not change due to the static nature of endowments (89-90).[25] It is likely true that professors, as urban consumers, were not able to insulate themselves from the rising prices and falling currency of the late sixteenth and early seventeenth centuries and, in the face of these challenges, they might have taken on multiple jobs. Yet, there are no actual complaints by professors in dire financial straits in Küçük's book. In fact, there is not one example of a real, historical professor mentioned who suffered from financial difficulties. *All of Küçük's impoverished professors are hypothetical*. This seems a bit odd given that they were some of the most educated people in the empire and presumably capable of voicing their discontent. Küçük acknowledges this silence,

24 See, for example, Madeline C. Zilfi, "The Diary of a Müderris: A New Source for Ottoman Biography," *International Journal of Turkish Studies* 1 (1977): 157-74; Madeline C. Zilfi, "The *İlmiye* Registers and the Ottoman *Medrese* System Prior to the Tanzimat," in *Contributions a l'histoire Economique et Sociale de l'Empire Ottoman*, ed. Jean-Louis Bacque-Grammont and Paul Dumont (Louvain: Peeters, 1983), 309-27.

25 Küçük states that this claim is based on Madeline Zilfi's work, but he does not include any reference in the footnotes, and I was not able to find such a statement in Zilfi's writings.

but attributes it to the fact that the professors were already too ignorant, corrupt, and browbeaten to voice their concerns and enter the historical record (101). Instead, Küçük only provides a few tangential comments and vague statements from the usual group of *naṣīḥatnāme*s, books of advice written by bureaucrats on how to reform the empire. The ones that Küçük highlights simply make accusations that positions go to those with connections, rather than merit, which is same complaint that every disgruntled writer made in the period, no matter what their profession. The complaint does not reflect an actual decline in the quality of madrasa professors or other functionaries, but the emergence of a dedicated and increasingly vocal corps of bureaucrats in the sixteenth century who believed that they were part of a new meritocratic system of governance.[26] Almost none of Küçük's sources say that professors were impoverished or that they needed to have their salaries raised. The only one who suggests that professors were poorly compensated was Nābī, who was not a professor himself, but a poet and bureaucrat. Around the year 1700, he writes that professors move around the empire, all for a measly fifty *akçe* (94). Yet, Nābī's words need to be contextualized within his book, the *Ḫayriyye*.[27] Nābī, unlike earlier bureaucrats who wrote *naṣīḥatnāme*s, was not providing a detailed and accurate look at the empire's finances and social life with suggestions as to how to fix it. His work was a broad tirade directed at every aspect and group of Ottoman society, with little attention to the actual details. For Nābī, the primary trap of Ottoman society is the pursuit of money; nearly everyone who goes down that path is corrupted.[28] A professor, in Nābī's view, is one of the more virtuous professions available to an aspiring young man.

One reason that it might be difficult to find professors complaining about their supposedly diminishing salary is that they were likely paid more than their nominal ranks of 20, 30, 40, 50, or 60 aspers or *akçe* a day. Dimitrie Cantemir (1673-1723), an astute observer of Ottoman society during his twenty-two years in Istanbul, made the following remark regarding the salary range of professors at the madrasa at the beginning of the eighteenth century: "The persons set over these Academies are call'd Muderis; that is School-Masters, who have an annual

26 Cornell Fleischer, *Bureaucrat and Intellectual in the Ottoman Empire: The Historian Mustafa Âli (1541-1600)* (Princeton: Princeton University Press, 1986).

27 Nābī, *Hayriyye-i Nâbî (Inceleme-Metin)*, ed. Mahmut Kaplan (Ankara: Atatürk Kültür Merkezi, 2008).

28 Nir Shafir, "Moral Revolutions: The Politics of Piety in the Ottoman Empire Reimagined," *Comparative Studies in Society and History* 61, no. 3 (2019): 595-623.

Salary, proportionable to the revenue of the *Jami* [mosque] to which they belong. Hence it is, that some have *three hundred, whilst others have but seventy Aspers a day*" (italics added).[29] What accounts for this discrepancy? The likely reason is that the nominal rankings of professors at 20, 30, 40, 50, and 60 *akçe* a day remained in place, as they served to denominate a spot in the hierarchy, but the actual salary could differ drastically. The same was true with Ottoman judges, who were also appointed along a hierarchy denoted by their daily salaries in *akçe* (again, 20, 30, 40, 50, and 60) but whose actual salary varied quite widely.[30] Even the lowest end of the salary range that Cantemir mentions is higher than what Küçük claims to be a professor's absolute maximum salary of fifty *akçe* a day. At the high end, it is the equivalent of what Galileo made as a professor and what Newton earned as Lucasian Chair of Mathematics, according to Küçük's calculations (93), and two and a half times higher than an elite practical naturalist like Ibrāhīm Müteferriḳa would make around thirty years later (183-184). Even teaching assistants and students could receive bursaries well above the nominal wages of the lowest ranks of the professoriate. In the eighteenth century, one student was given a *dersiye* of thirty *akçe* to supplement his living stipend as he prepared for his qualifying exams and waited for an opening in the professorial ranks, all without the expectation of working.[31] Moreover, Cantemir indirectly points out that a mosque's "revenues," that is, its endowments, did not play a role in stopping the payment of higher salaries.[32]

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29 Dimitrie Cantemir, *The History of the Growth and Decay of the Othman Empire*, trans. N. Tindal (London: J.J. and P. Knapton, 1734), 31-32; Although the accuracy of the chronicle portion of Cantemir's book has been challenged because it does not accurately reflect the Ottoman chronicles upon which it was supposedly based, his notations (from which the above quotation is taken) are considered invaluable first-hand observations about Ottoman society at the time. See Johann Strauss, "The Rise of Non-Muslim Historiography in the Eighteenth Century," *Oriente Moderno* 18 (79), no. 1 (1999): 223.

30 Although judges were paid by the state, in contrast to professors who were paid by endowments, it would not be surprising if a similar logic held. Ercan Alan, "1078 (1667-1668) Tarihli Rumeli Kadılık Rütbeleri Düzenlemesine Dair Yeni bir Kadı Mecmuası," *Türk Kültürü İncelemeleri Dergisi* 41 (2019): 47-48.

31 Zilfi, "The Diary of a Müderris," 163.

32 This a point that even the secondary sources that Küçük cites make clear: When needed, professors could routinely be paid more than their nominal salary by the mosque endowment. See, for example, the article by Çiftçi cited below. Küçük uses this article to argue that payments to scholars above their salary were definitively stopped after 1661. (91-92). Çiftçi's solidly researched article, however, only examines one specific madrasa, the

Professors' salaries also depended on their terms of employment. Not all professors were employed full-time; some just taught for portions of a year or combined their job with that of a mufti. For this reason scholars are often hesitant to speak about base professor salaries in the way that Küçük does.[33] Many types of salaries were given for part-time work. It is misleading to speak of a "starvation salary" of three-*akçe* a day for a timekeeper in 1729 (88), when it is clear that his job did not occupy his entire day. A minor appointment also conferred '*askerī* status onto madrasa graduates, nominally granting them elite status and exempting them from taxation. As is evident in the major prosopographies of Ottoman professors, many of which Küçük overlooks, professors had a number of ways of gaining additional income, such as teaching lessons to the public (*ders-i 'āmm*) in theology, Quranic interpretation, logic, and philosophy, which were endowed with special funds.[34] A study of professors in early eighteenth-century Damascus found that half were employed solely as professors, with the rest taking additional employment in the courts, foundations, or Sufi orders.[35] As these examples show, the state of salaries in the seventeenth century is at the very least much more complicated than Küçük makes it out to be.

That said, it is limiting to think of wealth solely in terms of salary. Wealth is not based in the individual but in the family, as often inherited as it is gained through hard work. The academy, perhaps with the short-lived exception of North America during the second half of the twentieth century, has always been literally or figuratively aristocratic, dependent on generational wealth to support advanced

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dârülhadis of the Süleymaniye complex and is much more circumspect in providing reasons for the start and end of additional payments. As Çiftçi points out, in the sixteenth century, this particular madrasa functioned as a waiting room of sorts for future military judges and high-level *ulema*, which makes it less reliable as a stand-in for all madrasas in the city. As Çiftçi himself notes, to understand professorial salaries, one has to dig deeply into the endowment registers and accounts in multiple sites. As usual, Küçük is generalizing from a very limited case study. Mehdin Çiftçi, "Osmanlı Medrese Teşkilatında Zirve: Süleymaniye Dârülhadisi (XVI-XVII. Asırlar)," *Usûl* 14 (December 2010): 63-65.

33 Stephen E. Tamari, "Teaching and Learning in 18th-Century Damascus: Localism and Ottomanism in an Early Modern Arab Society" (Ph.D. Dissertation, Washington, D.C., Georgetown University, 1998), 187n; Richard Repp, *The Müfti of Istanbul: A Study in the Development of the Ottoman Learned Hierarchy* (London: Ithaca Press, 1986), 118n.

34 Denise Klein, *Die osmanischen Ulema des 17. Jahrhundrets: Eine geschlossene Gesellschaft?* (Berlin: Klaus Schwarz Verlag, 2007), 40.

35 Tamari, "Teaching and Learning," 115-16.

study or to cushion professors' livelihoods. It makes little sense to imagine a seventeenth-century professor to be some sort of salaryman from the 1960s, building their wealth slowly but surely. One reason why scholars of early modern European science never examined professorial salaries is that many of its foundational figures were often independently wealthy or successful courtiers. The same could be said for the Ottoman educational world, especially after the early sixteenth century. Well-to-do families of scholars were quick to institutionalize their wealth, not only by monopolizing positions over generations but also by creating endowments to keep wealth in the family, partaking in the *malikāne* system, or, on a more minor scale, investing their wealth in businesses, as Minḳārīzāde Yaḥyā Efendi and Feyżullah Efendi did when they bought bakeries for their daughters.[36] Therefore, while some Ottoman professors might have taken on additional jobs, there were always professors who were free from financial concerns.

Küçük frequently compares salaries, juxtaposing the likes of Newton or Galileo against some hypothetical madrasa professor, the latter of whom never comes out on top (93, 228). Yet, there was no global market for academic labor in the seventeenth century that might substantiate such comparisons (e.g. 231). Affluence and poverty, moreover, are relative, and they are relative locally, not globally. Not only were living costs in the Ottoman Empire and England quite different, but one has to compare an Ottoman professor's salary to that of a judge, bureaucrat, or pharmacist at an equivalent rank to get a sense of whether professors really suffered a fall in social status as their salaries' buying power declined. A quick comparison between the salaries of professors and the salaries of bureaucrats and judges in the early seventeenth century, during the moment of inflation and devaluation, suggests that there was not a major discrepancy. The salaries of all types of bureaucrats rose with inflation and shifted in the type of renumeration but were largely equivalent to the nominal salaries of the professors, i.e. between 20-60 *akçe* per day.[37] Can we therefore really speak of a loss of social status among Ottoman professors as compared to other occupations?

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36 Tamari, 114; Madeline Zilfi, *The Politics of Piety: The Ottoman Ulema in the Postclassical Age (1600-1800)* (Minneapolis, MN: Bibliotheca Islamica, 1988), 71. For the information on the bakeries, see T.C. Cumhurbaşkanlığı Devlet Arşivleri, Mühimme Defteri 110: entry 1748, on 1109 L 29, and Mühimme Defteri 108, entry 1540, on 1108 M 20.

37 Linda T. Darling, "Ottoman Salary Registers as a Source for Economic and Social History," *Turkish Studies Associaton Bulletin* 14, no. 1 (March 1990): 28-29; Alan, "1078 (1667-1668) Tarihli Rumeli Kadılık Rütbeleri."

Another one of the book's arguments is that wealth provides time. Affluence allows professors to remove themselves from the necessities of productive labor and devote themselves to theoretical science. In this case, the extra jobs some madrasa professors had taken on would have been an impediment to deeper contemplation. Salaries are a poor proxy for affluence and leisure, though. Higher wages often bring with them greater responsibility and therefore less time for studious leisure. A better source of leisure is, again, inherited wealth. It might also be worth asking, whether a dervish living in a Sufi lodge, which was often a center of learning and scholarship and one that freed residents from the necessities of making a living, might then be equally adept at producing science. And how rich does a professor need to be before he or she can start pontificating about science? To put it another way, how exactly did leisure allow Isaac Newton to expand Aristotelian theory into modern science? The nebulous answer Küçük leaves us often resembles an older vision of science as emerging from the pure ratiocination of scientists' minds, when given enough money.

The point here is that while wealth and affluence undoubtedly played some sort of role in the production of science, it is impossible to reduce it, as Küçük does, to a poorly supported claim of stagnating salaries in the Ottoman Empire. Not only does wealth need to be conceived more broadly than salary, but the insights from the past forty years of scholarship on Ottoman decline need to be taken into consideration. Mainly, claims of Ottoman decline are not just an Orientalist invention, but are based in the concrete complaints and suggestions of Ottoman writers themselves.[38] To move beyond the ideological and personal motivations of these original writers, however, modern scholars realized that they needed to delve into the nitty-gritty details and look at how the Ottoman state and society worked in practice.[39] In Küçük's book, we find neither declinist complaints of Ottoman writers themselves nor the deep, archival research to substantiate his claims.

For all that has been said about wealth, less well-to-do students continued to attend the madrasa in the Ottoman Empire.[40] From the sixteenth century onwards,

38 Kafadar, "The Question of Ottoman Decline," 52-53 specifically.

39 See, for example, Darling, *Revenue-Raising and Legitimacy*; Leslie P. Peirce, *The Imperial Harem: Women and Sovereignty in the Ottoman Empire* (New York: Oxford University Press, 1993); el-Rouayheb, *Islamic Intellectual History*; Fleischer, *Bureaucrat and Intellectual in the Ottoman Empire*.

40 Klein, *Die osmanischen Ulema*.

there was an increasing number of students entering the madrasa. Many joined for academic reasons, but there were also those that did so to get free room and board, a small stipend, and a possibility of attaining '*askerī* status in the future.[41] Not all students became professors. Most did not actually. They found positions as judges, muftis, legal clerks, scribes, librarians, preachers, imams, Qur'an reciters, Sufis, missionaries, endowment administrators, tutors, schoolteachers, and more, a much broader range of occupations than Küçük is willing to admit. These students could attend one of the hundreds of madrasas across the empire, with over two hundred just in Istanbul by the eighteenth century.[42] For Küçük, the multiplication of madrasas is actually a symptom of the disease that afflicted Ottoman academia. Like graduate programs today, madrasa professors were apparently more interested in producing students than in those same students' future livelihoods (106-107). As the number of students rose ever upward, the intellectual caliber and social standing of madrasa scholars sank ever downward.

A more convincing interpretation might be that the madrasa became increasingly central to Ottoman urban life as Ottoman society became enmeshed in Islamic law. This process entailed not only the formal aspects of law, i.e. the growing role of the courts as a space to record and resolve personal and commercial affairs, but the increasing push since the late fifteenth century for Ottoman Muslims to lead their lives according to the precepts of Islamic law.[43] This required teaching schoolchildren the basics acts of worship of Islam as well as identifying and fighting off heresy on the frontier and at home.[44] The madrasa, in the Ottoman Empire especially, was primarily a law school not because of some decline in its social standing but because it provided the state cadres of scholars for its growing ambitions to shape daily life in Ottoman society according to Islamic law. Since their initial establishment in eleventh-century Seljukid realms (again as spaces to train scholars in law primarily), the madrasa as an institution has always evolved.

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41 Zilfi, "The *İlmiye* Registers," 323-24.

42 Zeynep Ahunbay, "Medreseler," in *Dünden Bugüne İstanbul Ansiklopedisi* (Istanbul: Kültür Bakanlığı ve Tarih Vakfı, 1994).

43 See, for example, Leslie P. Peirce, *Morality Tales: Law and Gender in the Ottoman Court of Aintab* (Berkeley, CA: University of California Press, 2003).

44 There is now a broad literature on the "confessionalization" of the Ottoman Empire along the lines of Sunni Islam. The most recent perspectives can be found in Tijana Krstić and Derin Terzioğlu, eds., *Historicizing Sunni Islam in the Ottoman Empire, c. 1450-c. 1750* (Leiden: Brill, 2020).

In the fifteenth and sixteenth centuries, the most famous madrasas were established by sultans, most famously the large complexes of Mehmed II and Süleyman, in order to institutionalize and bureaucratize the professors, jurists, and judges.[45] In the seventeenth and eighteenth centuries, the patronage of madrasas broadened, and viziers and *şeyḫülislāms* in particular established numerous, smaller madrasas that were not attached to larger mosque complexes. Köprülü Meḥmed Paşa, the grand vizier whom Küçük identifies as particularly disdainful of the madrasa (92), established a major one in the main artery of Istanbul, followed quickly by other major grand viziers and *şeyḫülislāms*. Even one of Küçük's practical naturalists, the doctor Ḥayātīzāde Muṣṭafā Feyżī (52), had one built. Of course, not every student was bright and pious nor did every madrasa professor somehow embody a millennium of Islamic learning. As Madeline Zilfi points out, by the end of the eighteenth century, there was also a great deal of nepotism, corruption, and mismanagement in the madrasa system.[46] Yet, far from signaling the institution's collapse, the proliferation of the madrasa in the seventeenth and eighteenth centuries suggests its continued vitality and its increased centrality in Ottoman society.

The Sciences and Ottoman Society

The primary oversight of *Science without Leisure* might be that it presumes that the madrasa and its scholars actually dominated the social field of the natural sciences in the first place, as universities do today. Küçük also envisions the economics of scholarship much like that of an idealized modern research university: professors, pursuing knowledge for its own sake, produce research, if allotted enough time, money and resources. The madrasa, however, never possessed the monopoly on knowledge production or legitimization that universities today wield nor is it clear how much the institution itself incentivized the production of new knowledge, especially in the natural sciences.

Küçük's belief in the primacy of the madrasa leads him to ignore the main source of funding, as it were, for scientific endeavors in the premodern Islamic world—the court. He only mentions the court offhand, when discussing patronage or the scientific labors of courtiers, whom he regards as burdened by the demands of the ruler (51, 226-227). Yet, the most common way for someone to

45 Repp, *The Müfti of Istanbul*; Abdurrahman Atçıl, *Scholars and Sultans in the Early Modern Ottoman Empire* (Cambridge: Cambridge University Press, 2017).

46 Zilfi, *The Politics of Piety*, 43-80; Zilfi, "The *İlmiye* Registers."

be paid for pursuing what we might call scientific activities was for a patron, often the sultan or a high official, to fund them. Sometimes patrons commissioned pieces from authors, but more often authors would dedicate and present their works to a courtly patron or patrons, hoping for a monetary reward or a steady position. Sultans, like monarchs throughout the world, often promoted scientific endeavors to demonstrate their mastery of all knowledge and the natural world.[47] Küçük claims that "medieval Islamic science and philosophy" required the "studious leisure" that only a madrasa could provide (84). Yet, the court was the main space through which Aristotelian theory and Greek thought was first translated and articulated in the medieval Arabic world, well before madrasas were founded. Avicenna wrote all of his works prior to the existence of the madrasa. Nāṣir al-Dīn al-Ṭūsī, the famous thirteenth-century philosopher, mathematician, and founder of the Maragha observatory, never worked at a madrasa and only had resort to courtly patronage.[48] The court funded the most famous astronomical/astrological initiative of the Ottoman period: the short-lived observatory of Taqī al-Dīn in Galata during the 1570s. And it funded and commissioned the composition and translation of countless other scientific texts. In all of these cases, the court is the primary source of money for the non-productive labor that Küçük sees as crucial for the advancement of theoretical science.

What then exactly propelled scholars to write new books while employed in the madrasa? One of the more compelling parts of Küçük's argument is the dearth of new theoretical writing in the sciences in the seventeenth and eighteenth centuries, the absence of which he connects to the economic decline of the madrasa. As Küçük notes, we have no new major theoretical works or even commentaries on classic works, like those of Avicenna, while there are many works of practical naturalism such as compendiums of drugs and medicines. One problem with this observation, however, is that this theoretical literature is also largely absent from the fifteenth and sixteenth centuries, when madrasa scholars were supposedly

47 Robert S. Westman, "The Astronomer's Role in the Sixteenth Century: A Preliminary Study," *History of Science* xviii (1980): 105-47; Dimitri Gutas, *Greek Thought, Arabic Culture: The Graeco-Arabic Translation Movement in Baghdad and Early 'Abbāsid Society (2nd-4th/8th-10th Centuries)* (London: Routledge, 1998); Mario Biagioli, *Galileo, Courtier: The Practice of Science in the Culture of Absolutism* (Chicago: University of Chicago Press, 1993).

48 Ṭūsī was also cut off from employment at the madrasa due to his Shi'i beliefs. He was eventually appointed as an overseer of a madrasa in Baghdad, though. Hadi Jorati, "Science and Society in Medieval Islam: Nasir al-Din Tusi and the Politics of Patronage" (Ph.D. Dissertation, New Haven, Yale University, 2014), 219.

well paid and well respected. In other words, theoretical literature in the natural sciences seems to be missing from the entirety of the Ottoman period, as Küçük himself admits (42). Küçük instead emphasizes the fact that physics via theology (*kalām*) and Avicenna's medical texts were *taught* in the madrasa, mostly by quickly referencing a curriculum of the madrasa set up to train medical students during the sixteenth century (59-69). Yet, even here Küçük's evidence does not add up. He leaves open the question of whether these texts continued to be studied in later centuries, and if one quickly scans the collections of Süleymaniye Library, built from the libraries of many former madrasas in Istanbul, one finds around fifty copies of Avicenna's *Qānūn*, a relatively large number for such a massive book. Many more copies of Avicenna's *Ishārāt* and other works also exist. While these numbers are low in comparison to the hundreds of copies of legal textbooks that every student read, their presence suggests that the books continued to be studied and copied in the madrasa throughout the Ottoman period at the very least.[49] In other words, non-productive, theoretical works were always taught and there seems to be no connection between scholars' wages and a predilection to teach or write in the sciences.

The larger question lurking in the background here is what precisely does the lack of new writings on a topic represent? It may be that every universiterian in early modern Europe could and did pen some uninspiring theoretical treatise on Aristotle, but this difference might reveal only a variance in practices of authorship. Traditionally, most Islamic scholars drafted commentaries when studying or teaching a work, yet only rarely were these works formally published. Both Kātib Çelebi (d. 1657) and Müneccimbaşı Aḥmed Dede (d. 1702), two major seventeenth-century intellectuals discussed below, wrote a number of commentaries on scientific and theological works that were simply not formally released as texts.[50] Does a lack of new texts—in one particular city and over a relatively short period—truly represent institutional or intellectual dissolution, as Küçük suggests? Or might it only suggest a relative lack of interest in one specific topic or approach?

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49 A more thorough form of proof would have been to go through the remaining copies of the *Qānūn* to see how students and scholars read it.

50 Kâtib Chelebi, *The Balance of Truth*, trans. G. L. Lewis (London: George Allen and Unwin Ltd, 1957), 142; Cevat İzgi, "Müneccimbaşı Ahmed Dede'nin Tanıtılmamaşı (*sic*) bir Tıp Risalesi," *Yedi Iklim* VIII, no. 56 (1994): 103. See the manuscript in Bayezit State Library, MS 4590.

The reality, of course, is that madrasa scholars routinely spent their lives writing unproductive theoretical works. They just wrote them on topics that interested them, like the "instrumental sciences" of language: logic, disputation, rhetoric, and grammar. As Khaled el-Rouayheb has shown, these sciences, especially logic and disputation, became increasingly central to the formation of madrasa-trained scholars in the late sixteenth to eighteenth centuries.[51] In earlier centuries, these sciences were regarded as auxiliary disciplines to the study of law and theology, but in the Ottoman period, many scholars found the intellectual questions they generated to be more engaging than the law and theology itself. Küçük brushes aside these sciences (87), regarding them and the study of law as nothing but practical training for future judges (84), but these sciences represent the foremost example of non-productive, theoretical labor by Ottoman madrasa scholars. Tens, if not hundreds, of scholars wrote treatises and commentaries and super-commentaries on these texts throughout the Ottoman period and they were copied many times over. This is not to mention the massive amount of theoretical literature that was written on law and theology. One might object that these writings are not on astronomy and medicine proper, yet they clearly show that there was no economic impediment to scholars devoting their life to scholasticism. Why should the natural sciences somehow require more studious leisure than the legal, theological, or linguistic sciences?

Readers of Küçük's book might also be surprised to learn that scholars in the seventeenth and eighteenth centuries actually complained that their students and colleagues devoted too much of their time to studying philosophy.[52] Of course, the Ottoman-era notion of philosophy, often referred to as *ḥikma* in Arabic and *ḥikmet* in Turkish, encompasses more than Küçük's narrower definition of Aristotelian thought.[53] Philosophy, in some cases, might have referred to the obsession with logic, disputation, and rhetoric. Yet, philosophy could also refer to currents like Illuminationist (*ishrāqī*) philosophy, which was based on an expansion of Neoplatonic thinking from the late medieval period. Müneccimbaşı Aḥmed Dede, the former chief astrologer and courtier, for example, wrote a commentary in his retirement on moral philosophy (*akhlāq*), which he felt had been overlooked by students of philosophy, many of whom were flocking to study Illuminationism

51 el-Rouayheb, *Islamic Intellectual History*, 117.

52 el-Rouayheb, 19-21.

53 For the latest elaboration of the history of Islamic philosophy, see Frank Griffel, *The Formation of Post-Classical Philosophy in Islam* (Oxford: Oxford University Press, 2021).

(and thus transgressing the shari'a, unlike the law-abiding Sufis).[54] Illuminationist philosophy was not just some theosophist gibberish about divine light, but a core part of scientific understandings the natural world. As Persis Berlekamp has shown, Neoplatonist philosophy, centered on the Illuminationist doctrine of emanation of Suhrawardī, anchored works on cosmology, wonder, and natural history in the Timurid period.[55]

Perhaps more importantly, logic, disputation, rhetoric, and grammar shaped the intellectual practices and theoretical vocabulary of Ottoman scholars. (These intellectual tools were also important in the development of early modern European science, albeit cultivated and developed through the scholarship of Renaissance humanism.[56]) The instrumental sciences defined the epistemological possibilities of Ottoman science, at least in the madrasa context. They declared what kinds of evidence were permissible, the types of argumentation that were acceptable, and the sorts of conclusions that could be derived. In other words, if we want to understand how Ottoman scholars crafted and discussed theory, whether in relation to law or medicine or otherwise, we have to look at the intellectual tools they utilized and these were the instrumental sciences of language. The predominance of these same intellectual tools might also explain why madrasa scholars seem to have been indifferent to the experiences and evidence of the practical naturalists highlighted in Küçük's book.

A madrasa education—that is, training in law, theology, and the instrumental linguistic sciences through a series of increasingly complex commentaries—retained its prestige throughout the seventeenth and eighteenth centuries, despite Küçük's claims to the contrary. The clearest example of this is the biography of Kātib Çelebi, the famous bibliographer and compiler from the seventeenth

54 Müneccimbaşı Aḥmed Dede, *Sharḥ 'Aḍud al-Dīn fī'l-akhlāq*, Süleymaniye Library, MS Ayasofya 2891, ff. 1b, 6b. On Illuminationism in the Ottoman world, see Marlene Kurz, *Ways to Heaven, Gates to Hell: Faẓlīzāde 'Alī's Struggle with the Diversity of Ottoman Islam* (Berlin: EB-Verlag, 2011), 196-248; Mustakim Arıcı, "Osmanlı İlim Dünyasında İşrâkî Bir Zümreden Söz Etmek Mümkün Mü? Osmanlı Ulemasının İşrâkîlik Tasavvuru Üzerine Bir Tahlil," *Nazariyat* 4, no. 3 (2018): 1-48.

55 Persis Berlekamp, *Wonder, Image, and Cosmos in Medieval Islam* (New Haven: Yale University Press, 2011).

56 One of the foundational books in this line of scholarship is Anthony Grafton and Lisa Jardine, *From Humanism to the Humanities: Education and the Liberal Arts in Fifteenth- and Sixteenth-Century Europe* (Cambridge, Mass: Harvard University Press, 1986).

century. Today, he is taken by scholars as the foremost representative of Ottoman genius for his massive bibliographic collection, his histories, and his geography, which often took inspiration from Latin sources. As his name suggests, he was a *kātib*, that is, a scribe. He did not attend a madrasa but was educated at a local elementary school and then at his apprenticeship as a clerk in the military. Yet, around the age of twenty, after passing by a public lecture at a mosque, he felt the need to educate himself further, and he did something remarkable. At an age when most boys had already finished the madrasa, he recreated for himself a madrasa education over the next two decades, all the while continuing his job as a clerk. He studied basic creeds and works of theology, followed by law, and then delved into Arabic grammar, moving on from basic studies to more complex commentaries on rhetoric and logic, and eventually teaching this material to his own students. We know this because he details every step of his transformation in his autobiographies, demonstrating how he prided himself for arriving at the level of elite scholars.[57] Even more relevant is the fact that in his thirties he came into a large inheritance, which freed him from the demands of his occupation as a clerk and allowed him to focus solely on studying. In other words, no longer limited by money, he chose to devote himself to what he considered to be the most intellectually rigorous and socially prestigious form of knowledge, namely, the sciences that professors studied and taught in the madrasa.

What we today define as the natural sciences—e.g. astronomy, mathematics, medicine—were also always part of the madrasa curriculum, though they were of secondary importance to law, theology, and logic.[58] Students learned mathematics and astronomy for practical purposes, such as calculating inheritances or timekeeping, as Küçük notes. Yet, unlike the university today, it was not the only place, or even the main place, to learn the natural sciences. Students who wanted to learn about medicine or astronomy at an advanced level would most commonly attend the semi-public study circles of expert scholars. Private study was not a sign of the collapse of the madrasa, as Küçük believes (15), but the primary way that the

57 Kâtib Chelebi, *The Balance of Truth*, 135-52; Gottfried Hagen, "Katib Çelebi," Historians of the Ottoman Empire, March 2007, https://ottomanhistorians.uchicago.edu/en/historian/katib-celebi.

58 On the content of the madrasa education during the Ottoman period, see Cevat İzgi, *Osmanlı Medreselerinde İlim* (Istanbul: İz Yayıncılık, 1997); For pre-Ottoman periods, especially in the Mamluk and Seljukid lands, see Sonja Brentjes, *Teaching and Learning the Sciences in Islamicate Societies (800-1700)* (Turnhout: Brepols, 2018).

sciences, and most knowledge, had always been taught. Take Kātib Çelebi, who picked up enough astronomy and mathematics from his studies with Ar'ec Muṣṭafā that he felt sufficiently confident not only to start his own study circles but also to insult the *şeyḫülislām* Bahā'ī Efendi for his ignorance.[59] The aforementioned Müneccimbaşı Aḥmed Dede came to Istanbul to study at the Mevlevi lodge, but attended the study circles of Müneccimek Meḥmed to learn astronomy and astrology and that of a certain Ṣāliḥ Efendi to study medicine.[60] This "post-graduate" education, conducted in private homes, mosques, and Sufi lodges was important for all disciplines of knowledge, not just the natural sciences. (We can even consider the madrasa simply an institutional setting that supported such private study circles.) It was a space not only to study advanced texts and topics and to prepare for their qualifying exams, but also a place for young men, who often had to wait years for their first appointment, to forge connections that would be central to their career. Minḳārīzāde Yaḥya Efendi, a future *şeyḫülislām*, for example, studied logic and law with his *enişte*s, Velī Efendi and *şeyḫülislām* 'Abdurraḥīm Efendi, the same men with whom Kātib Çelebi studied.[61] Years later, Minḳārīzāde would teach Müneccimbaşı Aḥmed Dede in the study circle he ran and eventually suggested to the sultan that he appoint Aḥmed to the position of chief astrologer (*müneccimbaşı*).[62] The madrasa was certainly an important place for education and intellectual discussions, but it never held a monopoly over knowledge production in the Ottoman world. While there were licenses for students who wanted to become professors in the madrasa—initially distributed through patronage and connections and increasingly accompanied with an examination after the mid-seventeenth century—these were only meant to control the quantity and quality of professors and tested on questions of logic and rhetoric.[63] The Ottoman intellectual world was always pluralistic,

59 Kâtib Chelebi, *The Balance of Truth*, 28, 141-42.

60 Mîrzâ-zâde Mehmed Sâlim Efendi, *Teẕkire-i şu'arā*, ed. Adnan İnce (Ankara: T.C. Kültür ve Turizm Bakanlığı, 2018), 109; Şeyhî Mehmed Efendi, *Vekâyi'u'l-fuzalâ: Şeyhî'nin Şakâ'ik zeyli*, ed. Ramazan Ekinci and Derya Örs, vol. 3 (İstanbul: Türkiye Yazma Eserler Kurumu Başkanlığı, 2018), 2229-30; This Ṣāliḥ Efendi might have been Ibn Sallūm, the famous chief physician, according to İzgi, "Müneccimbaşı Ahmed Dede'nin Tanıtılmamaşı (*sic*) bir Tıp Risalesi."

61 Şeyhî Mehmed Efendi, *Vekâyi'u'l-fuzalâ: Şeyhî'nin Şakâ'ik zeyli*, ed. Ramazan Ekinci and Derya Örs, vol. 2 (İstanbul: Türkiye Yazma Eserler Kurumu Başkanlığı, 2018), 1128-29.

62 Sâlim Efendi, *Teẕkire-i şu'arā*, 107; Şeyhî Mehmed Efendi, *Vekâyi'u'l-fuzalâ*, 3:2229.

63 Repp, *The Müfti of Istanbul*; el-Rouayheb, *Islamic Intellectual History*, 125-28; Mustafa Irmak, "Bir Belâgat Kitabı Olarak *Mutavvel* ve Osmanlı Medreselerinde Okunuş Biçimi Üzerine Bir Risâle," *Marmara Üniversitesi İlahiyet Fakültesi Dergisi* 42, no. 1 (2012): 173-96.

decentralized, and relatively non-institutionalized. There was no need for the madrasa to decline for Küçük's practical naturalism to rise.

It might also be too soon to declare that older theoretical texts on the sciences were completely absent, even for practical naturalists, as Küçük argues. While we should never assume that the Islamic legacy was some sort of universal library that informed the ideas of every Muslim, neither do we need to cast Ottoman scholars working on the sciences as laboring in the dark. If one starts to delve into the reading histories and notes of scholars, one can easily find that they had access to theoretical texts. To return to Müneccimbaşı Ahmed Dede, the long-serving chief astrologer and courtier whom Küçük briefly identifies as one of his practical naturalists due to fact he never attended the madrasa (52-53,104), we can look through his notebooks to see exactly what he was reading and using. There we find copies not only of the usual works on logic, disputation, jurisprudence, philosophy, but also a copy of ʿAlī Kuşçu's astronomical and mathematical texts, the *Fatḥiyya* and *Muḥammadiyya*, and an abridgement of Ismāʿīl Jurjānī's medieval medical encyclopedia, the *Tadhkarat Khwarazmshāh*.[64] Küçük regards any such reference to older theoretical texts by scholars at the time as an attempt to invent an Islamic tradition in the face of European novelty (139). While perhaps true in certain cases, a simpler answer might be that classical texts were available and used by scholars who wanted them. Only when we dig into the rich archives and libraries of the former empire, can we unearth this fuller picture of Ottoman intellectuals.

Concluding Thoughts

At the end of the day what should a reader take away from *Science without Leisure*? Although not elaborated in sufficient detail, Küçük's concept of practical naturalism, and its implicit argument that the sciences should be situated within concrete practices, represents an important shift in method for historians of science of the Ottoman Empire and the Islamic world at large, who still largely narrate the history of science through its ideas and institutions. Küçük's book reminds us that we should always look for science outside the madrasa, although his assertions of the madrasa's monopoly over knowledge ironically reifies the institution's centrality. At the same time, the book insists that historians of science not reduce science to mere practice, that theory is a unique and ineluctable part

64 For Müneccimbaşı Aḥmed Dede's notebook, see Süleymaniye Library, MS Pertevpasa 623, specifically ff. 251b-342a.

of that construct we call modern science. Indeed, establishing a new relationship between theory and practice might have been the central problem with which participants in the Scientific Revolution grappled. Although Küçük's materialist (rather than culturalist) explanation for the supposed lack of theory in the rest of the world is ultimately unconvincing, the original observation about Europe's unique relationship to theory might still stand and remains a promising avenue for future research.

Küçük ultimately views Ottoman science as a zero-sum game: Practical naturalism could only arise from the economic and intellectual ruins of the madrasa. As I have argued in the pages above, however, there is little proof to support this claim. There is no evidence that madrasa professors were poorly paid in comparison to equivalent occupations nor did the madrasa suffer a decline in social prestige. The madrasa continued to support scholars who wished to undertake non-productive, theoretical labor; these scholars simply focused on those theoretical disciplines that interested them, like logic, language, and philosophy, rather than the natural sciences. Moreover, unlike the university today, the madrasa never held a monopoly on the production of knowledge, especially in the natural sciences. In fact, the madrasa was a relatively marginal space for the study and cultivation of the natural sciences, which like all forms of advanced knowledge, flourished in private study circles and was funded by courtly patronage. A more plausible narrative of Ottoman science is that practical science and madrasa-based theoretical work existed side by side, only intersecting at some key and fruitful moments. In fact, much of the practical science that Küçük identifies as emerging specifically from seventeenth and eighteenth-century Istanbul had existed long before the Ottoman Empire. A world of science based in the shops of merchants, the workshops of artisans, or in the chanceries of bureaucrats, distinct from grander, more abstract forms of knowledge, was likely as present in tenth-century Baghdad or fourteenth-century Cairo as it was in seventeenth-century Istanbul.

Küçük's book also tells another tale: the growing role of *ḳalemiye,* the bureaucratic scribal corps, in the affairs of the state and science from the late seventeenth century onwards. While cognizant of this transformation (49, 111), Küçük prefers to speak of practical naturalists rather than bureaucrats. It is worth pointing out, though, that nearly every protagonist in his book, from Ibrāhīm Teẕkireci to Nābī to Yirmisekiz Meḥmed Efendi, was in the employ of the increasingly powerful *ḳalemiye*. Significantly, the education of bureaucrats had separated from

the madrasa during the seventeenth and eighteenth centuries and was based in elementary schools and apprenticeships. The *ḳalemiye* in this period was also in charge of diplomatic affairs in eighteenth century, thus their close connection European technology and ideas. We can see through Küçük's book how this branch of the Ottoman state began in the same period to claim possession over the natural sciences to solidify both the state itself and their own position within it.

More than anything, Küçük's book is an invitation to reconsider the virtues of an older and perhaps idealized form of scholarship, in which scholars had the freedom to mull over and develop ideas in their heads for years, rather than running around scattershot, scrounging for grants and publishing every little tidbit in a desperate bid to demonstrate their productivity. The true value of science is not in the minor articles or even its practical applications, but in the grand ideas and theories. In Küçük's view, this form of science requires a good amount of leisure and an even larger amount of largesse. There will always be science, conducted by the middling peoples of the world in their own little, practical way, but making true progress, that is, progress in theory, requires investment. What happens when we fail to invest in the pursuit of knowledge for its own sake? Küçük's vision of the Ottoman Empire is a dark mirror, reflecting less the realities of Istanbul's past than our own society's fears and anxieties for the future.