

The Islamic Scientific Manuscript Initiative (ISMI) Towards a Sociology of the Exact Sciences in Islam*

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Introduction

Virtually all serious researchers in the field of the history of science in Islamic societies have lamented, at one time or another, the lack of study, let alone editions, of the thousands of manuscripts dealing with scientific subjects that remain unexamined. Our knowledge of science in Islam is, for the most part, episodic, focusing mainly on texts that were translated or had some relevance to Europe, or on accidental discoveries. There have been few attempts to survey or categorize genres of writing, to understand the context in which texts were produced, or to study readership of those texts.¹

There are several ways in which researchers have sought to remedy this situation. One is to edit and study the texts and, if possible, translate them into a European language. Starting in the nineteenth century, this has been done to a limited extent. There are, though, a number of limitations. While having an edited text is of inestimable value, it remains a single text. Editors have seldom attempted to address broader questions such as: Was the author working as an isolated individual or as part of a scientific

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¹ This lack of historical data has, unfortunately, not deterred a number of modern commentators from providing us with "authoritative" accounts of those genres, those contexts, and those readers.

group? Was this a well-known text? Did it influence subsequent workers in the field? Was it studied in a school?

The reason for this lack of knowledge, or even the lack of an attempt to answer such questions, is not hard to uncover. Historians of Islam, like their medieval Latinist colleagues, are often overwhelmed by an embarrassment of riches.² The sheer quantity of manuscript material has made it difficult to manage or survey the material in a way that could allow one to address these issues. Another reason is the tedious and slow process involved in editing texts. Again numbers play a role. A limited corpus, such as the Greek scientific writings, were systematically edited in the nineteenth and early twentieth centuries and became the basis for careful analyses.³ To do something similar for medieval Islamic scientific manuscripts would present a daunting task, and no such project has been proposed. Another reason is simply the lack of qualified and trained researchers. The interest in science in Islam has gone in cycles during modern times. In post-Enlightenment Europe, it was generally dismissed but recently it has been experiencing a revival. This has not, though, led to large numbers of competent researchers entering the field, whether in Europe, America, or in Islamic countries.⁴

Although the current available resources have been indispensable for research, they represent only a beginning. When dealing with such a mass

² For a comparable situation and how it has been dealt with in the field of medieval Latin studies, see Steven J. Livesey, "Lombardus electronicus: A Biographical Database of Mediaeval Commentators on Peter Lombard's *Sentences*," in *Medieval Commentaries on the Sentences of Peter Lombard. Current Research. vol. 1*, ed. Gillian R. Evans (Leiden: E. J. Brill, 2002), pp. 1-23. A resource for part of the corpus of medieval European scientific writings is Linda Ehrsam Voigts and Patricia Deery Kurtz (eds.), "Scientific and Medical Writings in Old and Middle English: An Electronic Reference" [on CD] (Ann Arbor: University of Michigan Press, 2001).

³ Here we are thinking foremost of the editions made by J. L. Heiberg for the Teubner series in Leipzig.

⁴ On the other hand, there have been several noteworthy projects in recent years that have contributed to our knowledge of what we are calling the sociological aspects of science in Islam. These include the ones on timekeeping, astronomical tables, and instruments undertaken by David King and his group in Frankfurt, Germany; see now, David A. King, *In Synchrony with the Heavens: Studies in Astronomical Timekeeping and Instrumentation in Medieval Islamic Civilization* (Leiden: Brill, 2004). The recent publication of *Mathematicians, Astronomers and Other Scholars* by Boris Rosenfeld and Ekmeleddin İhsanoğlu has built upon the earlier work of Heinrich Suter as well as G.P. Matvievskaia and Rosenfeld (see note 8 for citations), and has provided us with an overview of the entire corpus of the exact sciences in Islam; an important feature of this work is that it incorporates the pioneering work on Ottoman science done by İhsanoğlu and his team in Istanbul. Another important research group is the "Barcelona School," centered at the University of Barcelona and led most recently by Julio Samsó, which has considerably increased our knowledge of science in al-Andalus and North Africa. We are also beginning to understand the relation of Islamic and East Asian Science, both along the Silk Road and further east, thanks to the work of Michio Yano and his colleagues in Japan and China, as well as the research of Benno van Dalen in Frankfurt.

of material, it is inevitable that there will be considerable ambiguity concerning many of the titles and authors we encounter. On the one hand, we have the problem of anonymous authors; on the other, we have the proliferation of authors with the same or similar name. In addition, libraries have on occasion changed the names of their collections and their numbering systems, often rendering older catalogues with important information difficult to collate with new listings. Indeed, some libraries have themselves ceased to exist and have been incorporated or centralized into other institutions. More importantly, we have few tools, aside from painstaking work, to connect the productions of our subjects with wider social, political, and intellectual contexts.

The Goals of the ISMI Project

As a contribution towards ameliorating the situation described above, the Islamic Scientific Manuscripts Initiative (ISMI) was developed to provide a means for rationalizing the cataloguing of both metadata (standard bio-bibliographical information) and content data for all manuscripts in the “mathematical” sciences (broadly conceived) that were produced in the Islamic world before 1900 CE. The basic tool is an electronic database that allows for the entry and extraction of data contained within Islamic scientific manuscripts. The ultimate goal is to catalogue all Islamic astronomical, mathematical, and related manuscripts⁵ in a relational database; to record paleographic, codicological, content, and user information gleaned from these manuscripts; and to set up a convenient means to access this information. As such, it will not only provide a powerful research tool for scholars in the field, it will also furnish a means to answer some of the “sociological” questions discussed above.⁶

The ISMI database project is meant to be more than a simple catalogue. It will provide the user with information on some 1,700 authors, the content of texts (estimated at between 2,500 and 5,000) that were produced by these authors, and tens of thousands of manuscript witnesses to these texts, a fair percentage of which reveal details regarding readership and ownership, institutional locations where the manuscripts

⁵ In the initial stage, the focus will be on astronomical manuscripts. But later, the database will include manuscripts in astrology, mathematical geography, optics, harmonics, and technology. Medicine and natural philosophy will generally be excluded, but a related database project at McGill (PIPDI: the Post-Classical Islamic Philosophy Database Initiative) will include works in natural philosophy. Our hope is that colleagues will use ISMI’s open-source database for other fields.

⁶ “Sociological” data would include information such as copyists, place of copying, readers, teachers, etc.

were copied, studied, and taught, and the relationship of original texts and their commentaries and supercommentaries –all of which will help draw a picture of the social and intellectual con-texts of these works. Of particular interest will be the capability of the data-base to allow for research into issues of the relationship of science and religion in Islam. For example, it will provide information on the teaching of the sciences and mathematics that occurred in the Islamic religious schools (*madrassa*'s) as well as the extent to which scientific material was used by religious scholars in their writings.

In addition, the database could also be used by scholars doing research into the history of Islamic and European scientific interactions. Since it contains a considerable amount of biographical and other general information, it will potentially be useful for persons outside the field of Islamic science who wish to find out about Islamic scientists, their works, and their social milieu.

Examples of “Sociological” Data Retrievable from the Database

It is often repeated that Islamic science declined precipitously after 1200 CE (usually attributed to the religious reactionaries such as al-Ghazālī [d. 1111 CE]), that the Ancient Sciences were not taught in the schools (*madrassa*'s), and that the influence of Islamic science on Europe ceased after the magical date of 1200. Each of these statements is contradicted, or at least seriously questioned, by information in the database.

1) An examination of the astronomical textbook *al-Mulakhkhaṣ fī 'ilm al-hay'a* by Maḥmūd ibn Muḥammad ibn 'Umar al-Jaghmīnī (fl. 1220 CE) indicates that it and its commentaries and supercommentaries are extant in thousands of copies spread throughout the Islamic world. (There are more than 300 copies of Qāḍīzāde's commentary in Istanbul alone). This is during the time of the supposed decline of science in Islam. When combined with what we now know of the advanced astronomical work done from 1200-1800 CE in the Islamic world, we can see that there was an important network of learning and innovation that occurred during these centuries.

2) The case for the institutionalization of science is bolstered by examining Vatican arab. MS 319, which contains a copy of *al-Tadhkira fī 'ilm al-hay'a* by Naṣīr al-Dīn al-Ṭūsī (d. 1274 CE) that was copied in 1284 CE at the Nizāmiyya College in Baghdad. A copy of the commentary on *al-Mulakhkhaṣ* by al-Sayyid al-Sharīf al-Jurjānī (d. 1413 CE) [Cairo, Dār al-kutub, Hay'a MS 96] has an indication that it was studied by a student at al-Azhar in Cairo.

3) Vatican arab. MS 319 contains a number of Latin glosses, probably dating from the fifteenth or sixteenth century, that indicate knowledge of Arabic at the time and interest in this important text.

Some Technical and Conceptual Issues

A prototype of the ISMI database is now running online. Thus far the first version of the database has been designed and successfully tested, and it currently contains entries for some 1 100 authors,⁷ several hundred entries for titles and manuscripts, and supplementary material for a number of them.

As mentioned above, the database is currently being transformed from a fairly traditional Microsoft Access database into an object-oriented, open-source one. The advantages are manifold; in particular, the new structure will allow us to create relationships “on the fly,” which will be especially useful as we discover new types of connections we wish to document. Thus it may be useful to distinguish student-teacher relationships from relationships between peers. And one can have more than one relationship between a text and an author. Thus “was written by” would only be one of several possibilities; another might be “has been mistakenly ascribed to.”

There are any number of technical issues that need to be solved. Fortunately, with the wide acceptance of Unicode, the problem of diacritical markings and the use of multiple scripts in the same database, or even field, has been solved. Though still difficult, it has now become possible to search for text in both Latin and Arabic script, even when the text has diacritical marks. There still remains the problem of how to standardize entries for *hamza*, *‘ayn*, and dotless Arabic characters. And deciding on a transliteration (or transcription) system for Arabic-script languages presents both scholarly and political issues.

Another technical issue involves data flow and verification of data. Data will be submitted by both experts and non-experts, who may be encouraged to send information via forms on the internet. How will this

⁷ The preliminary list of authors, which was compiled between 1996 and 1999, came from names listed in the works of G. P. Matvievskaia and B. A. Rosenfeld, *Matematiki i astronomi musulmanskogo srednekovya i ikh trudi (VIII-XVII vv.)* [Mathematicians and Astronomers of the Muslim Middle Ages and Their Works (VIII-XVII centuries)], 3 vols. (Moscow: Nauka, 1983) and Heinrich Suter, “Die Mathematiker und Astronomen der Araber und ihre Werke,” *Abhandlungen zur Geschichte der mathematischen Wissenschaften* 10 (1900). Additional names will be compiled from the ever expanding number of manuscript catalogues and from B. A. Rosenfeld and Ekmeleddin İhsanoğlu, *Mathematicians, Astronomers, and Other Scholars of Islamic Civilization and Their Works (7th - 19th c.)* (Istanbul: IRCICA, 2003).

information be tagged? Since it is unlikely that all sources will be treated equally, steps will be taken to verify data before it is certified for final entry into the database. This is a good example of a technical issue that is also conceptual. In a “WIKI” world, it is becoming more acceptable that information be considered provisional and open to continuous modification. But, somehow, traditional scholarly standards will also need to be maintained.

Another issue that needs to be addressed is accessibility of the sources themselves. From a scholarly perspective, having all the manuscripts online would be ideal. But ownership rights present a major hurdle. One possible compromise we are exploring with several libraries is the idea of putting manuscripts online with images acceptable for “scholarly use,” while libraries retain rights to publishable quality images.

Of course acknowledgment of sources is an issue when dealing with online publishing. We believe that the standard system of citation must continue to be used. But in addition, it is important that individual contributions that are made outside of normal publishing channels be acknowledged as well. And here we have made provisions for citing contributors who have sent us information on manuscripts.

Another issue of prime importance is the time-frame we envisage for the data base to be completed. Clearly the project will take generations even to reach a point of comprehensiveness, if by that we mean examination of all relevant manuscripts; in a sense the project will never reach completion because of the continual updating and reinterpretation of information. But here it is important to distinguish a useable database from a finished database. The latter may never be attainable, whereas the former could be available within a few short years. For example, bio-bibliographical data from existing catalogues could be entered in even a shorter time, but we hope to verify this data before disseminating it online—thus the need for the additional year or two. The important thing to keep in mind is that a structure would be in place for entering any data we obtain, whether from data editors working at McGill or from colleagues worldwide.

Finally, it is worth mentioning here that the resources provided by the Canada Foundation for Innovation and the Max Planck Institute for the History of Science will allow us to have some 5-10 editors, students, and technical experts working on the project at any one time for the next four years. Of course, we hope that our initial success will lead to renewed funding.

Funding and Partnerships

Because of a partnership agreement, ISMI has been able to obtain funding from the Max Planck Institute for the History of Science (MPIWG) in Berlin, Germany; technical expertise, including development of a new version of the database is also being provided by the MPIWG. Additional funding has been provided by the American Council of Learned Societies and the Institute of Islamic Studies at McGill University. Recently, long-term funding has been assured through a major grant from the Canada Foundation for Innovation.

ISMI has a distinguished Board of Advisors (made up of both individual and institutional members) that offers advice on the long-term goals and procedures the project should be taking. Consultants/data collectors are currently working in Turkey, Canada, Germany, and India, and we anticipate having data collectors in additional countries in the coming years. Promising talks are currently underway with several manuscript libraries, and our hope is that we will be able to digitize and put online manuscripts from those libraries for use by researchers. At present several libraries and institutions have ongoing projects to digitize and make accessible Islamic manuscripts; these include Leipzig University, the University of California in Los Angeles, the U.S. National Library of Medicine in Bethesda, Maryland (USA), the Turkish Ministry of Culture, and the Alexandrina Library in Egypt. It is also worth mentioning that the Iranian publishing organization, Miras Maktoob, has compiled a database of some 340,000 manuscripts held in Iranian libraries that it hopes to make available in the near future.

Ultimately, the success of ISMI will depend on the willingness of researchers in the field to share their expertise and information with their colleagues through the medium of the ISMI database. The project would then become ongoing, with information being continuously updated, corrected, and augmented. We are optimistic that this will indeed take place: first, because of the technologies that allow instant communication through means such as the listserve of the Commission on History of Science and Technology in Islamic Societies; and secondly, because of the spirit of cooperation and sharing that is everywhere evident in this generation of scholars that has grown up with the internet and the world wide web.

