

## PREFACE

THIS BOOK IS ABOUT the medieval “scientific method”—the recursive argument method—and how it was transmitted along with the college from Buddhists to Muslims in Central Asia, and from there to medieval Western Europe.

Two decades ago, I first attempted to work on the history of the recursive argument method (traditionally known as the ‘scholastic method’, or more precisely, the ‘disputed questions’ method) and in 1990 published a paper on it. However, though I felt sure that there was a connection among the Latin, Arabic, and Tibetan varieties of the method, I could not explain the differences among the versions I had found and was unable to resolve the many problems connected with its origin and spread. So I abandoned the topic.

In 2007, while preparing the final manuscript of my book *Empires of the Silk Road* for publication, it occurred to me once again to look into the *Mahāvibhāṣa*, a work obtained by the great traveler-monk Hsüan Tsang when he was in the Central Asian city of Balkh in 628 or 630 and later translated by him into Chinese, in which language alone it is now preserved. I had looked at the text in or around 1990, but did not understand its metalanguage well enough to discover the argument structure used in it. This time, with the inestimable help of a translation of one section of the text done by Takeda Hiromichi and Collett Cox, I found what I had previously suspected might be there. I then reexamined the earliest Latin works that use the method, and at the same time looked into early examples of similar works in Arabic. Partly as a result of doing all this at around the same time, I realized that earlier analyses of the structure of the method, including my own, were misleading or wrong, and the direct connection of the different versions of it had therefore been overlooked. I presented the results of my discoveries in lectures given in 2008 in several locations in the United States and Europe. Between the Paris and Oxford lectures, it occurred to me that I had also missed the most characteristic and essential feature of the method: formal recursion.

Subsequently I continued to work on the topic, producing a brief article on some points as I then understood them and a rough draft of a book. There the matter remained for awhile as my duties as a teacher took up

most of my time and energy for the rest of that year and the beginning of the following year. Then, though I was busy with teaching while in Vienna in the late spring and early summer of 2009, I nevertheless managed to write the first actual manuscript of the book, and to revise the above-mentioned brief article. When I was once again free to work on the project full time, in the last two months of that summer, I completely reorganized and rewrote my manuscript, and revised it that fall semester. I then submitted it to Princeton University Press in December.

In the process of further revising the manuscript, I have discovered that my analysis of the data as of the end of 2009 continues, in all significant aspects, to be confirmed, and has actually been strengthened, by everything additional I have found since. In particular, intensive examination of the putative exceptions suggested by colleagues has been interesting, and in some cases relevant, but on the whole it has ended up not having any significant effect on the book's argument. In addition, although I had always believed that the late George Makdisi was basically on the right track with regard to the history and transmission of the college and the recursive argument method (the scholastic method) from the Islamic world to medieval Western Europe, I found that some of the details of his arguments—especially those involving the education system—also seem to be confirmed, with one significant lingering exception.

The exception appears to be law, which Makdisi was convinced was the source of the Classical Arabic recursive argument method, since the Islamic colleges were devoted mostly to law. My investigations suggest it is indeed possible that there may be material relevant to the history of the recursive argument method in Medieval Latin, Classical Arabic, and early Indic texts (or their Chinese translations) concerned directly or indirectly with law. Most significantly of all, it is expressly stated by Avicenna that he learned the recursive method from a teacher of *fiqh* (Islamic jurisprudence), thus supporting Makdisi's theory. The arguments I myself have seen in my forays into the legal literature appear to be different, but law is not a subject I am trained in, familiar with, or understand very well, even in English, not to speak of any other language. Scholars specializing in *fiqh* should test Makdisi's theory by examining early "disputed questions" texts in Arabic to determine the relationship, if any, of their argument structure to that of the recursive argument method described in this book. Until that is done, Makdisi's thesis about a possible legal connection remains untested.

I like to think that I have now answered most of the major problems I set out to solve, but much remains to be done. There is certainly a great

need for further study of the recursive argument method in Classical Arabic philosophical and theological literature. In addition, we need a major study of the *Aṣṭa-grantha*, much more work on the *Mahāvibhāṣa* (a gigantic book), and detailed examination of Tibetan literature for possible examples of Tibetan authors' use of the Indian form of the recursive argument method. When this book was about to go into production it was suggested to me that the method had actually been adopted by early Chinese Buddhist scholars and is used in some important commentaries in that tradition, though it later fell out of use. Unfortunately, I learned this too late to be able to get a legible copy of the one study that seems to discuss this and give examples of it, so as to incorporate it into the present book. I hope that other scholars will pursue these matters. Although in several important cases the treatment of the topics covered in the present book apparently constitutes the first published attempt at analyzing them, it is not (I hope) the last word on anything. Further study is still very much needed by specialists in each relevant field—for example, early Central Asian Buddhist texts; Indian Buddhist texts; Arabic philosophical, scientific, and theological texts; Medieval Latin philosophical, scientific, and theological texts; and early Chinese Buddhist commentaries—including careful, detailed treatment and presentation of more examples of the recursive argument method. Among the most serious lacunae are an English translation of Abelard's *Sic et non*, a translation and study of Avicenna's *De anima*, and a translation of Vasubandhu's *Abhidharmakośabhāṣya* from the Sanskrit.

This book treats aspects of the history of science in Asia and in Western Europe. For medieval Europe, unlike the other regions, there is a considerable body of scholarly literature on this topic. I do not attempt to revise the current general consensus of specialists in medieval science or postmedieval science in any significant way. Instead, I mainly present new research and new analyses regarding little-studied or even untouched topics within that field, and would like to suggest that this material does have major implications for the current consensus. Therefore, although I have relied on the work of my predecessors, this book aims to present what I have been able to contribute myself, within my own limitations, and it addresses topics of interest to me and about which I have been able to learn a little, from my perspective.

In connection with the above, I would like to respond to a comment by one of the anonymous referees of the manuscript of this book. As far as I have been able to determine after much personal searching and much inquiring of scholars specializing in relevant fields, the existing scholarly

literature on the specific topics to which this book is mainly devoted is extremely limited. No one has published anything, beyond the occasional short remark, on the recursive argument method of early Central Asian Buddhist literature (which is preserved mainly in Chinese translations), even when those texts have been translated into a Western language. No one has published anything on the same method in medieval Classical Arabic philosophical texts, though it has been referred to (evidently incorrectly) by a few scholars, above all by George Makdisi, apparently the only scholar to do more than mention the existence of the scholastic method in Classical Arabic. No one has noted that the recursive argument method of Medieval Latin texts (the fully developed scholastic method used by, for example, Albert the Great and Thomas Aquinas) first appears not in works originally written in Latin, but in the mid-twelfth-century Latin translations of works originally written in Arabic by the great Central Asian natural philosopher, Avicenna. And as far as I know no one has published a detailed analysis of the recursive structure of the method, the differences between it and other formats used in medieval scholastic literature in those traditions and in Medieval Latin, and so on. It would perhaps have made my task easier if there were at least a few such works, or if I had been able to discover those I may have missed. It would certainly have been easier if someone had identified which Buddhist works, Classical Arabic works, or even Medieval Latin works contain the method. But with a very few exceptions that is not the case. As is normal scholarly practice, I cite the relevant works published on the topic, including my own, but for many topics there are only source citations and my own arguments based on my analysis of the sources.

To put it another way, this book is not a bibliographical summary of what has been done before, with little new but my English style. If it were, it would be drastically shorter than it already is, considering the extremely limited secondary literature available on the topic. It would also be written by someone else, not by me, because I have no interest whatsoever in compiling anything of that sort. Most of the references that are included in the book are there strictly to help the interested reader find the sources and closely relevant scholarly literature I have used or cited, not to buttress every statement of common-knowledge historical fact.

This book is also not about ancient science, medieval scholastic thought, ancient to contemporary debates about the validity of science, or many other things that one could write a book about. Much could and should be written about such topics, and others of contemporary relevance, but there is already enough “new knowledge”—data, analyses, theories—in

this book to occupy the time and energy of the self-appointed gatekeepers of several academic fields. So I have done my best to eliminate the slightest hint of such unsavory issues, and instead encourage those interested in them to read the “modern” chapters of my 2009 book and apply the ideas and analyses in them to the contemporary situation with respect to science and related subjects.

I apologize to readers who would prefer a work such as one of those described hypothetically above, but as it happens, introductory books on these topics, including some textbooks, already exist for Western European medieval studies (the only subfield in which such a problem might come up to begin with); some of them are cited here and there in the text for the benefit of interested readers.

A related observation comes to mind here. A certain amount of repetition has ended up being unavoidable. (If I were very clever I would somehow have managed to make it recursive.) This seems to be due in part to the episodic presentation both by chapters and within individual chapters, and in part to my desire not to lose the reader amidst all the detail.

A problem particular to the topic of this book is that almost everything that has been published (again nearly all of it on Medieval Latin topics) that ostensibly treats the recursive argument method—what has usually been called the “scholastic method” by earlier specialists—has little or nothing to do with that method itself. When the scholarly literature does refer to a text’s argument method, it rarely distinguishes clearly, if at all, between the early *sententiae* ‘sentences’ or *quaestiones* ‘questions’ structure still used for native Latin compositions in the twelfth century, and the *quaestiones disputatae* ‘disputed questions’ structure (the “recursive argument method” structure), which first appears in Latin translations from Arabic in the mid-twelfth century and is first definitely used in new compositions by authors writing in Latin shortly after 1200 AD. It is certainly true that some medievalists have not overlooked this difference, but although they themselves seem to be perfectly clear on the issue, other scholars are far from clear about it. This seems mainly to be because studies on the Medieval Latin “scholastic method” can actually be about almost anything imaginable, even though they apparently specify their topic as the *quaestiones disputatae* ‘disputed questions’ of famous writers such as Albertus Magnus (Albert the Great), Thomas Aquinas, Roger Bacon, and many others, which are obvious, classic examples of the recursive argument method. Some works display a stunning unawareness of the differences among the radically unlike literary formats used from antiquity through the Middle Ages, all of which are often lumped

together as examples of the “scholastic method.” The widespread confusion seems to have a simple explanation: the *term* ‘scholastic method’ has become so diffuse and imprecise that it no longer conveys any useful information. I have therefore come to the realization that it is imperative to abandon it. In its place I have adopted a precise, purely descriptive term, *recursive argument method* (or ‘recursive argument’ or ‘recursive method’; for short) and have used it throughout.

The structure of the recursive argument method is recognized explicitly by several leading scholars, some of whom even provide a thumbnail outline of the method’s constituent parts (see chapter 2), though they do not, of course, use my new terminology, and the recent works by Edward Grant do contain much that is illuminating on the method in connection with its use in scientific works. However, I have looked in vain for a study that analyzes *in depth* the structure of the method and what is distinctive about it, whatever an author might have thought that to be. There are some fine studies of medieval manuscripts, of related historical issues, and of the niceties differentiating various functions, ceremonial uses, or other aspects of the fully developed Medieval Latin method, but as far as I could discover there are no studies directly relevant to this or the other topics on which I have mainly focused.

Finally, it is well known that medieval science was on the whole not done by experiments in laboratories. Where or how was it done, then? The scholarly consensus among specialists is that medieval scientific activity was done in public disputations, both oral and written. These disputations used the medieval recursive argument method, the topic of the present book. Accordingly, that method was the actual “scientific method” of the Middle Ages and Renaissance. I have not attempted to trace the fate of the recursive argument method in later times, other than to show that it did not entirely disappear. It is still present in the modern concept of the ideal scientific method, and is still used practically, to some extent, in scientific research reports, which are briefly discussed in chapter 8.

I know that as always many problems still remain, and I have undoubtedly made missteps along the way. I sincerely hope that other scholars will follow up on my attempts to lay the groundwork for further research on the topics covered, and will improve on what I present here. I wish success to all who continue the quest.