



Review: [untitled]

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Reviewed work(s):

The Rise of Early Modern Science: Islam, China, and the West. by Toby E. Huff

Source: *The American Journal of Sociology*, Vol. 100, No. 3 (Nov., 1994), pp. 817-819

Published by: The University of Chicago Press

Stable URL: <http://www.jstor.org/stable/2782407>

Accessed: 08/02/2010 13:11

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my reservations, I want *all* my students in science studies and cultural studies to read this book. I would certainly tell them first about my theory of proxy warfare and make them read chapter 7 before they read the start of the book. But this is a profound book that says fascinating things about cognitive variations in the ways we learn, that revels in and struggles with the mythology of science that is tearing at the heart of sociology, and that admires enchantment but still probes the purpose of cultural studies. It asks, almost by mistake, about the fate of the 19th century promise of social science for the world of the late 20th century, where cultures are mixing and changing faster than before. It helps us to confront our problems by giving them historical location. In some ways, this book is almost better than we deserve—it is serious and honest, and it embodies the contradictions of our field and our times.

The Rise of Early Modern Science: Islam, China, and the West. By Toby E. Huff. Cambridge: Cambridge University Press, 1993. Pp. xiv + 409. \$54.95.

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The basic argument presented in this volume is that the fortuitous concatenation of Greek natural philosophy, Roman civil law, and rationalist Christian theology during the 12th-century Renaissance created an intellectual climate conducive for the emergence of the European scientific revolution in the 17th century. By comparison, the promising development of Arabic science before the 14th century was subsequently aborted by the power of the Islamic clergy to Islamicize foreign knowledge and to exclude natural science from the education curriculum in universities. Similarly in China, where the Song dynasty was well advanced in technology before the 13th-century Mongol conquest, the retarding influence of the imperial state and its civil service examination curriculum based on the Confucian classics prevented the emergence of autonomous institutions conducive to social legitimation of scientists' roles. Only in late medieval Europe did legal, social, and institutional revolutions occur that permitted the rise of autonomous universities in which study of natural science was legitimated by both state and society. Only in Europe did the requisite "neutral spaces for public discourse" appear that "created structures of action and agency" conducive for growth of the impartial and skeptical "ethos of science."

Adopting what Huff calls "civilization frames of reference," this book describes "cultural climates" in medieval Europe, the Islamic world, and imperial China that abetted or hindered the emergence of modern science in each cultural region. The cultural trajectories of Christian Europe, Islamic Asia, and Confucian China are examined according to their affinities with the roles of scientists in society, the development of

social norms of impartiality and legitimate skepticism, and the elaboration of an autonomous reward system controlled by professional members of scientific communities. Islamic breakthroughs in the study of the natural world were initially advanced because of input from Greek and Indian natural philosophy and mathematics. In the fields of optics, astronomy, and medicine, Islamic scholars were important pioneers, but the fate of the Marâgha Observatory, which flourished in Tabriz between 1259 and 1305, is typical, according to Huff, of the short-lived success of Islamic science. Clerical power based on Islamic mysticism, fundamentalist appeals to sacred law (*shari'a*), and the inherent elitism and secrecy of Islamic elites over the long run created obstacles that effectively prevented the emergence of modern science. In China, social and political elites had access to the fruits of Islamic science in the Mongol era, and they had access to European science through the Jesuits in the 17th century. Despite their technological head start in the Song dynasty, the Chinese were unable to break through roadblocks erected by the imperial state (which imposed secrecy on state astronomers and mathematicians) and the alternative and more appealing reward system (based on competitive examinations to become a Mandarin official) that diverted incentives toward study of the Confucian classics and away from the precise study of natural phenomena. In Europe, according to Huff, the late medieval "legal, social, and institutional revolution" singularly provided fertile ground for planting seeds for modern science in the 12th century that grew to maturity in the 17th century.

Huff's history of European, Islamic, and Chinese science focuses on the intellectual history of natural philosophy in cultural and social context. By rejecting Joseph Needham's claim (in *Science in Traditional China* [Cambridge, Mass.: Harvard University Press, 1981]) that there is no meaningful distinction between science and technology, Huff too conveniently concludes that experimentalism after Galileo was not the driving force in the birth of modern science and that in China technological superiority had little to do with Chinese natural knowledge. By sowing the seeds of scientific revolution in Catholic culture before the Protestant Reformation, Huff presents the "symbolic technology" of late medieval Europe as the key to that revolution without fully coming to grips with the problem of why it took over five centuries for European natural philosophy to begin to produce the industrial revolution. In the final analysis, therefore, Huff's otherwise thoughtful comparative history of science essentializes science as a universal mental exercise practiced in neutral institutions within an open society. The intellectual revolution—its philosophical roots and cultural context in Catholic Europe—is not properly framed in light of the later political and industrial significance of the scientific revolution in Protestant, northwestern Europe. In surgically eliding technology and industry from the problem of the scientific revolution, Huff thus avoids coming to grips with the "Protestant" history of science and industry as elaborated by Margaret C. Jacob in

The Cultural Meaning of the Scientific Revolution (New York: Knopf, 1988) or the actual practice of science as described by Bruno Latour in *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge, Mass.: Harvard University Press, 1987). Moreover, without technology, the history of science in Catholic Europe, the Islamic world, and imperial China is limited to the domains of Catholic, Islamic, and Confucian institutions. Huff's comparison of Catholic Europe, Islamic Asia, and Confucian China in terms of natural philosophy and educational institutions is timely and rewarding, but his conclusions are still insufficient to understand fully *why* elites and commoners in Europe, the Islamic world, and China were interested in the natural world and *how* they actually created and applied their natural knowledge before the scientific revolution.

The Sources of Social Power. Volume 2: The Rise of Classes and Nation-States, 1760–1914. By Michael Mann. New York: Cambridge University Press, 1993. Pp. x + 826.

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The Sources of Social Power is the second part of Mann's analysis of the social construction of power. Its goal is to locate the dynamic sources of power in the developing nation states from the 18th to the 20th century.

The basis of Mann's analysis is that societies are shaped by the constant interplay between economic, ideological, military, and political power. In this work, he examines this interplay and presents an argument that the dominant forces shaping Western societies in the 18th century were economic forces and military power, while those of the following century were economic and political forces.

In making his case, Mann pinpoints five significant historical events in which, he argues, the sources of dominant power were revealed either in the successful defense of the sociopolitical status quo or in its effective defeat by challenging sociopolitical groups. In employing this method, he avoids the trap of attempting to present the whole period and so does not fall prey to the simplifications and sweeping generalizations that have beset so many large-scale "histories of the nation state."

Aware of the complexity involved in the structuration of orders of power, Mann sets out the economic, ideological, military, and political features of social order as distinct but often interrelated sources of power. Having set out the complex scenario of power in ahistorical, sociological terms, he analyzes their involvement in the production of orders of power within each of his selected historical scenarios. The method of analysis is an interesting attempt to practice an integration of a diachronic portrayal of human action with a synchronic analysis of processual move-