For more than a decade, the collaboration between two eminent scholars of ancient Greece and China has been well known to students of their fields. Their long expected book, The Way and the Word: Science and Medicine in Early China and Greece, has now reached our desks. This monumental work not only casts new light on the two ancient civilizations, but also redefines the history of science and medicine. An exemplar of sophisticated scholarship, the book nonetheless is exceptionally accessible to a wide ranging audience. Sir Geoffrey Lloyd and Professor Nathan Sivin offer their ground-breaking discoveries from lifelong scholarship to the general reading public, tackling issues that are larger than specialists’ arguments on specific questions. These issues include the dynamics and paths of the history of science, the wholeness of thought and action, and interactions among social structures, political authority, values and conceptions, and systematic inquiry. In exploring these issues, they elucidate fundamental questions in the history of science and methods of comparison that are inherent in multiple disciplines of the humanities.

Lloyd and Sivin investigate the beginnings of science and medicine in two complex ancient civilizations, China and Greece. They pursue it through a comparison, but instead of comparing selected concepts or practices from each culture, they compare entire processes. They treat each culture as a ‘manifold,’ namely, the continuum of intellectual, social, and institutional dimensions as well as the interactions uniting these dimensions into a single whole (pp. xi, 3). They ask questions such as what motivated thinkers in each culture, how they were educated and how they made a living, what their relationship was to the structure of authority, whom they tried to persuade and what their ways of persuasion and argument were, and what frames of understanding they created in each culture. Such comparison of the ‘cultural manifolds’ manifests the authors’ overall assumptions of historical inquiry. They abandon questions that have occupied most of our comparative histories, such as who did what first and why China (supposedly) did not develop science (or philosophy or religion). Instead, they see the history of science, as well as any other species of history, as unfolding from different cultural manifolds, each having its own way and pattern of development. They describe such processes of history as depending on hope, effort, and chance,
rather than destiny or some ineluctable pull exerted by modern knowledge (p. xiii). Therefore, they argue that modern natural science is a multilinear descendant of many technical cultures, from Persian, Indian, Islamic, Chinese, Greek, and other civilizations.

The book is organized in six simple chapters, with an appendix on the evolution of the Chinese cosmological synthesis. The introduction (chapter one) lays out the grounds for comparison. There are basic similarities between ancient China and Greece: both evolved elaborate cultures; people in both societies saw the need for systematic inquiry into the natural world; specialist groups in both societies were leading such inquiries; and such inquiries were intensely value-laden. Within these broad similarities lie important differences, such as their varied responses to the legacy of tradition, the distinct roles and ambitions of their thinkers, the particular conditions under which the thinkers worked and specific values they exemplified, and their special techniques of persuasion as well as their designated audiences. Differentiating ‘ancient science’ from modern science in terms of method and institution, the chapter defines the former as the ‘bid to comprehend aspects of the physical world,’ including stars, the human body, animals and plants, and the composition of things and the changes they undergo (p. 4). The authors ask, as their first step of inquiry, what the ancient investigators themselves said about their subject matter and aims. This is a complete turn away from the convention of counting up ancient accomplishments according to modern criteria. The materials for comparing China and Greece range from about 400 BC to 200 AD. These rich materials contain amazing counterparts. One can set Euclid and Ptolemy side by side with Chinese treatises on mathematics and medicine. Equally interesting is the lack of equivalence between the two cultures in other areas, such as Aristotle’s writings on physics or animals, or the Chinese writings on resonance and ch’i.

The four chapters on comparison are divided evenly, with two on Chinese and two on Greek civilization. The two parallel stories each move from the livelihood of thinkers, at the social end of the manifold, to scientific and medical concepts at the intellectual end. Chapter two describes the social and institutional framework of China. To become a philosopher or scientist depended primarily on birth within the elite group eligible for office, called shih士. In the continued political turbulence around 400 BC, the shih had changed from being aristocratic warriors to depend on official employment or patronage for their livelihood, using their literacy and other expertise. The key to status and privilege was education, and access to it continued to depend on birth. Literacy remained a clear class distinction, common among the elite and out of reach for commoners. Consequently, philosophers and scientists generally were from the elite class. Patronage at local courts did not give philosophy a place of particular importance; it treated philosophers as just one kind of retainer or guest, among a wide variety of pragmatic experts or technicians. The imperial state that replaced this monopolistic patronage provided official employment to the intellectuals and technicians, but because of the state’s interests in a narrowly defined orthodoxy, the philosophers
who depended on state patronage and employment ended up accepting the orthodoxy. The state control and subsidizing of the sciences also made scientific and medical authors conform to the ideology and accept the priorities of the state.

Such a social structure affected the community of learning, the inquiries they pursued, and the modes of argument. ‘Individuality,’ in its strict definition, was hardly found among thinkers, since identification with a group and aspiration toward an imagined orthodoxy was the Chinese norm (pp. 43-44). Education was largely a matter of collectivities, based on the kinship of master and disciples, and centered on a written book and its memorization. Various traditions of thought were actually lineages of textual transmission, and each saw ideas as embodied in its founder or a line of masters. Such communities were held together by a belief of common descent rather than the like-mindedness of philosophers or an academic institution as in the Greek case. In science and medicine, text-centered master-pupil lineages also emerged from the first century BC on, adapting the philosophical classics to technical traditions and maintaining a patrimony of ancient sages as the source of wisdom and technical innovations. Neither patronage and official appointment nor the lineage community encouraged confrontation. Open, face-to-face debate was rare and reserved mostly for politics. Disagreement was mostly muted or indirect. Arguments were expressed mostly in writing, addressed to rulers rather than peers. The ideas of thinkers and scientists were expressed in many types of writing. Classics, canons, and memorials have no counterparts in Greece, while dialogues, treatises, and commentaries were created in both cultures, though each used them quite differently.

Chapter three addresses these same questions about the social and institutional framework in Greece. The fundamental division of Greco-Roman society was “between slave and free.” (p. 82) Among the free, further distinctions were made by birth and wealth. The rise of city-states and changes in the style of warfare had weakened the power of the ancient noble families, but birth into an aristocratic family remained important for potential leaders. Wealth was the main division among the free, and the way rich and poor were treated differentiated oligarchies from democracies. While the former denied the poor the right to hold office, the latter insisted that all free citizens were equal. The social structure depended on a minimal literacy of the citizens, and elementary education was regular and not restricted to any particular group. Unlike China, Greece had no scribal class, education did not serve to maintain the status of a literate elite class, and libraries were not handed on by lineages nor reserved for the exclusive use of palace officials. The social origins of philosophers and scientists, therefore, were much more diverse than in China. They ranged from the wealthy and aristocratic end—as exemplified by Plato—to slave families, including Epictetus and Bion. Doctors, engineers, and other experts could be found among slaves and in every stratum of society. A large number of philosophers and scientists came from poor and middle range families, among them Aristotle and Socrates. Becoming a philosopher or scientist depended less on birth or wealth than on personal ambition and determination. The livelihood of these philosophers and scientists came pri-
marily from practical activities or teaching. Patronage of philosophy by rulers or the wealthy was limited and irregular, while patronage of doctors and engineers was more substantial. Compared to the Chinese, Greek intellectuals were far more isolated from political power, their professions were not bureaucratized, and they did not need birth, wealth, or education as entitlements to their profession.

Within this social structure, philosophers and scientists were not concerned about securing a patron as much as making a reputation among colleagues. Philosophers before Plato were generally strongly individualistic, negating any collectivity. Plato’s Academy and other schools established after were private institutions. The pluralism within each school and competitiveness among them made argument and debate their essential activity. Differences of opinion were explored and exploited. A similar situation existed in science and medicine. Before the Hellenistic period, there was a high degree of individualism among doctors and there were no medical schools or sects. In the Hellenistic period, medical sects were pluralist and competitive, and no group of medical theorists claimed themselves Dogmatists. These philosophical and medical schools were held together as collegial bodies, for purposes of argument or disputation, and functioned to serve the ambitions of their own members more than of rulers. Pupils were intent on making their own reputations rather than defending the teacher, and deviation and defection were common. Greek philosophers and scientists expressed their ideas mainly in debate, lectures, and writing. As much writing as the Greeks created, intellectual exchange was mostly in the oral mode. Competitive debates in front of a lay audience were the format for the presentation of ideas. Argumentative debate using both rhetoric and dialectic was a preoccupation of Greek culture, as the major way of producing, transmitting and developing ideas. Adversariality also existed in more technical writings of treatises and commentaries, even though the sense of an ongoing debate was less exhibited.

Both the social framework and the mode of argument affected the content of Greek theories, and chapter four investigates the history of some fundamental questions of Greek philosophy and science. The concepts of elements, nature, and reality appeared in the fifth and fourth centuries BC, when the fierce competition for intellectual prestige drove philosophers and scientists to formulate their own focal problems. They often claimed their theories as their own inventions, rather than being handed down from ancient sages as in Chinese culture. Competing against traditionalists, these new Masters of Truth demarcated their subject matter as the natures of things that can be investigated (p. 156). Among these new Masters, however, the investigable nature was also disputed. Arguments about causation linked directly to Greece’s legal context and this link influenced both philosophy and science, provided models for intellectual inquiry, and cultivated rigorous demonstration which was lacking in the Chinese context. Ideas about the cosmos show more similarities between China and Greece: both views on the cosmos were value-laden; both mirrored the macrocosm in the microcosms of the body and the state; and both represented the cosmos as a harmonic and
ordered whole. But beneath the similarities, the two civilizations differed in the understanding of questions as well as in the answers given. The Chinese agreed that a benevolent ruler was the guarantor of cosmic harmony, while the Greeks exploited a variety of models of political constitutions. The Chinese view of the hierarchy of things was that of interdependence between binary opposites such as yin and yang or low and high, while the Greeks viewed such opposites as independent from one another. Human rulers were held responsible for cosmic harmony in China, while the Greeks saw rational forces controlling the cosmos independent of human activity or responsibility. The development of the fundamental questions of nature, causes, elements, and the cosmos, therefore, was influenced by Greek legal practice, political experience, and social circumstances that encouraged competition and argument rather than cooperation and consensus.

In China, chapter five reveals, such fundamental questions were motivated by a one-way discourse aimed at rulers, rather than open competition among peers. The study of cosmology or medicine was attributed to some sagely origin, and the stress was on moral and political relevance rather than objective reality. Seekers of the Way of the cosmos saw inquiry as self-cultivation, as embodiment of the Way, which included but went well beyond empirical and cognitive understanding. Chinese cosmology developed in three stages, each maintaining the centrality of the ruler. Around 400 BC, local rulers began to rely on experts for communication with Heaven and Earth and these experts devised diverse sets of numerical categories to link social entities and activities with phenomena in nature. A succession of scholars in the following century turned these resources toward a new double aim: providing polities with a cosmic basis and persuading rulers to entrust much of their authority to their bureaucracies. In the early imperial era, the second stage, philosophers such as Lü Pu-wei, Liu An, and Tung Chung-shu systematically used certain widely circulating concepts—ch'i, yin-yang, and five ‘agents’—to build philosophical doctrines of the cosmos, the state, and the body. A fully developed cosmological doctrine, appearing in the third stage during the first century BC, finally unified ch'i, yin-yang and the five ‘agents’ as a single complex of dynamic transformation, as demonstrated in Yang Hsiung’s _Supreme Mystery_ and the anonymous medical treatise _Inner Canon of the Yellow Emperor_. In this development the Chinese did not need terms to describe ‘nature’ (the physical or material universe). Instead, they saw the body and the state as microcosms of a single cosmic order, and their central concern was the ruler who could maintain resonance between Heaven and Earth. The sciences supported by the state further elaborated this philosophical synthesis. Astronomers calculated celestial movements and interpreted heavenly omens to influence political decisions. Physicians used microcosm to explain therapeutic experience. The influence of state support and the lack of competition explain why Chinese philosophers and scientists sought general agreement on basic issues instead of competition and used existing courtly discourse rather than coining new concepts.

The final chapter returns to the strategic questions raised in the introduction: Why did China and Greece produce the sciences they did? What can this study
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tell us about the ways science developed in antiquity? The chapter answers with seven points of comparison and conclusion: 1) The fundamental concepts in play in China and in Greece were strikingly dissimilar. Greeks focused on nature and elements, and their main concern was to make a reputation for their competence and superiority as new Masters. Chinese focused on tao, ch’i, yin-yang, and the five ‘agents’, and their concern was to advise and guide rulers. 2) The livelihood of Greek philosophers and scientists rarely depended on government employment or patronage, as they earned their living by teaching or by practicing their technical skills. Their Chinese counterparts, in contrast, relied mainly on rulers’ patronage or official employment. 3) The applications of cosmology and science were a state concern in China, while the Greek city-states were not keen on such applications. Chinese agreed on the role of the ruler as mediator between heaven and earth, and the state and cosmos formed a seamless whole. Greeks, however, did not agree on the best kind of political constitution nor on what type of political structure the cosmos was or resembled. 4) Pluralism was generally limited in China due to central rule, while in Greece it was not just possible but even mandatory, since intellectuals had to make a name for themselves and aggressive innovation was a means to do so. 5) A public sphere—either serving as a tool of imperial control or representing elite interests that sometimes opposed the ruler—engaged most Chinese intellectuals, while the sphere of operation for most Greek intellectuals was the private, in that their reputation depended on self-presentation rather than the personal favor of a ruler. 6) Disagreement and disputation were encouraged in Greek culture, while consensus was emphasized in China. 7) The Greek ways of persuasion were face-to-face oral debates in front of a public, whereas Chinese ways of persuasion, often in written form, were directed at the rulers rather than colleagues or the public. The answer to the strategic questions, supported by this comparison, is that neither China nor Greece had a monopoly on the wherewithal to develop science. Each exhibited its own distinctive potential for the pursuit of such investigations. The dominant Greek way was through the search for foundations, the demand for demonstration, for incontrovertibility. The principal Chinese approach was to find and explore correspondences, resonances, interconnections. Each approach had its strengths and weaknesses.

This is an extraordinary book, the kind that comes along only once in so many years. It presents lavish information and profound knowledge through graceful writing and lucid arguments, and it lures the reader with fascination into the ancient worlds of science and medicine, which have been abstruse and forbidding for non-specialists. While providing the general public with an exceptional combination of sophistication and accessibility, the book is also seminal in two highly specialized fields. Specialists will find many arguments in this book provocative and will also benefit tremendously from the book’s extensive historical and comparative framework, where his or her own topic of research could be situated. Between the public and the specialists, above all, the book has revolutionized
comparative methodology and the conception of the history of science, both of which have an impact on various humanistic disciplines.

Comparison has been a method of inquiry for many disciplines. For example, sinology—the study of Chinese language, culture, and history from outside China—is intrinsically comparative. Much of its analytical vocabulary and conception of questions has been developed through Euro-American concepts and paradigms. In decoding ancient Chinese culture, the implicit question is often how ‘China’ differs from both the historical and the modern ‘West.’ Similarly, the study of ancient Greece cannot avoid questions of its similarities with the modern West and its difference from other ancient civilizations. In the twentieth century, disciplines explicitly crowned with the word “comparative” mushroomed—comparative sociology, comparative history, comparative philosophy, and comparative literature. While comparison has been a shared, elementary, and essential method of inquiry, it has often been achieved at a high cost. One cost has been historical change of the subject. The comparison of two cultures, or certain parts from them, has been achieved most often through various a-historical generalizations or abstractions of cultural types, if not blatant essentialism. Historical change, and the internal conflicts, contradictions, and dynamics that cause the changes in cultural structures and concepts, have been either pushed into the ‘background’ or simply excluded as noise or distraction. A second cost has been the larger cultural and social context. Certain philosophical concepts, social elements, or cultural phenomena have been regularly taken out of their social-cultural whole, to be compared with an equally decontextualized counterpart from another culture. And a third cost has been the human agent. Comparisons of formative or structural features of cultures or cultural elements seldom address the human agent responsible for their existence and change. These internal methodological flaws have aggravated the external challenges to comparative studies from globalism and postmodernism, which often deny the plurality of cultural worlds and deconstruct cultures as distinct entities altogether.\(^1\) This partially explains the declining interest in comparative subjects, reflected in a shift towards ‘intercultural’ or ‘trans-cultural’ questions instead.

Way and Word has appeared just in time to vigorously renew comparative methods and comparative problematics. The idea of ‘cultural manifolds’ helps rectify all three flaws just mentioned. It puts historical process, human agents, and interactions among aspects of a single yet dynamic cultural whole into the foreground as primary subjects of investigation. Throughout the book we learn about the philosophers, scientists, and specialists, their livelihood and motivations, their social and intellectual environments, why they made the choices they made and under what historical circumstances, as well as how their lives and ideas changed over time. With this book setting such a model, one sees how

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\(^1\) For the challenge of globalism to comparative studies of cultures, see for example Haun Saussy, *Great Walls of Discourse and other Adventures in Cultural China* (Cambridge, Mass.: Harvard University Press, 2001), chaps. 2. 6.
comparative studies can still contribute to humanistic knowledge while avoiding the pitfalls of conventional comparative methodology.

In addition to these innovations in methodology, the book also breaks new ground in the history of science. History of science has long been dominated by the common conception of “science” as a unique modern phenomenon—the ‘normative,’ ‘positive,’ or ‘universal’ science that is ‘the quintessential form of rationality,’ both a cause and an effect of modernity. Science in this modern and Western conception is defined as systematic inquiry into the physical and natural world through experimentation, measurement, and verification. And history of science serves to chronicle when and by whom each contemporary scientific fact, law, and theory was discovered or invented. Discontent with this unhistorical conception of science and the concept of a ‘development-by-accumulation’ model of history, Thomas Kuhn proposed, four decades ago, that a “new concept will not be forthcoming if historical data continue to be sought and scrutinized mainly to answer questions posed by the unhistorical stereotype drawn from science texts.” Since then, the history of science in the modern Western context has been rewritten. The sole drive for the production of scientific knowledge—namely objective, value-free, and pure rationality—has been seriously deconstructed. The Frankfurt School of Critical Sociology uncovered social conditions, political processes, and the power of domination in the production and use of scientific knowledge. Marcuse explores the ‘instrumentalistic’ character of modern science, stating that scientific and technological rationality protects the ‘legitimacy of domination’ of those who control the productive use of technology. Harbermas further terms such instrumental use of science and technology a form of ‘ideology’—a specific form of political domination. Foucault unveils “the political status of science and the ideological functions it could serve” in his simple equation of power/knowledge. Anthropologist Stanley Tambiah further points to the monopoly effect of science invading all domains of human life, ‘imperialistically’ expanding to fill all the moral or social space in which we live, and depriv-


4 For a summary of the Frankfurt School critique of scientific rationality, and the summary views of Marcuse, Harbermas, and Foucault, see Tambiah (1990), pp. 2, 145-147.

5 Herbert Marcuse, One Dimensional Man (Boston, Mass.: Beacon Press, 1964), chap. 6.


ing other modes of consciousness or other world orientations any space for existence. The same process has also been progressively carving up the wholeness of life into separate domains of specialized knowledge and territories, corroding any existing unifying cosmology and the unifying themes of purposive life. This process of simultaneous monopolization of moral and social space and fragmentation of human life has concerned many Post-modern theorists.

While such theorists have deeply altered our views of modern science, *Way and Word* revolutionizes the history of science by rewriting its beginning. It replaces the unilinear evolution of science from the Greek tradition with a multilinear history of many technical traditions. It negates the single direction towards modern natural science as the fate of all histories of scientific and technical traditions, and proposes a new model that views history as undetermined or stochastic. Instead of asking which culture discovered more facts or methods similar to modern science, it raises new questions for the ancient histories. These questions coincide with those aimed at the modern conditions mentioned above. *Way and Word* inquires into the social production and social use of scientific knowledge in ancient civilizations. It brings into the picture interest groups and patronage, modes of living and motivations, communities of science and their relationship to political power, economic conditions, social prestige, and how these affected the modes of argument and fundamental issues and conceptions of scientific inquiry. These innovations point clearly to a future course of research. Within the study of ancient Chinese and Greek civilizations, and after the century-long splitting of the subject matter into segregated disciplines, the holistic and interactive relations between knowledge and society, between thought and action, are now in great need of reconstruction. For the history of science, the book calls for further testing of its new models, methods, and hypotheses in relation to other ancient and early modern cultures.

*Way and word* is a monument of history of science and medicine, and a great contribution to humanistic research. It should be widely read by both specialists of early civilizations and historians of science, as well as anyone with intellectual interest in the wholeness of knowledge and society and the pluralistic development of history.

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8 Tambiah (1990), pp. 149-151.