

Shen Gua's Empiricism. By Ya Zuo. Harvard-Yenching Institute Monograph Series 113. Cambridge, MA and London, England: Harvard University Asia Center, 2018. Pp. xiii + 333. \$49.95/ £39.95.

I was surprised when I first began reading a few chapters of Ya Zuo's *Shen Gua's Empiricism* (hereinafter abbrev. "SGE"). Despite its title on empiricism and the fact that most contemporary studies on Shen Gua 沈括 (1031–1095) were conducted from a viewpoint of the history of Chinese science, SGE is not a book of history of Chinese science. Nor is it a book of the Chinese history of empiricism, if the term is conceived in its conventional philosophical sense. But this does not mean SGE does not include a good up-to-date introduction to the studies of Shen Gua's thoughts and achievements in the history of Chinese science. The book also has a detailed introduction of Shen Gua's life and career, with special attention to Shen's practices, skills, and knowledge acquired and developed at every stage of his career. However, the main thrust of this book, it seems to me, is philosophical and even epistemological. According to Ya Zuo, she is writing a book of the Chinese history of knowledge.

From this perspective, it is easy to see that SGE has a number of merits which are not available in other studies of Shen Gua. For example, SGE seriously compares Shen Gua's philosophy and practices concerning knowledge with other major political or philosophical figures in the Northern Song, such as Wang Anshi 王安石, Su Shi 蘇軾, Shao Yong 邵雍, and the Cheng brothers (Cheng Hao 程顥 and Cheng Yi 程頤). These major figures are labelled by SGE as (total) "system builders" of various kinds, be it ontological, philosophical, or intuitive, all committed to the unity of the world, whereas Shen was instead building a "nonsystem" without committing to any transcendental unity. This is an interesting distinction, crucial to SGE, and I will discuss later in this review the merits and problems of it. Thus, in SGE, Shen Gua emerges as an epistemological builder of nonsystem, in direct contrast with other more conventional and familiar system builders of the Northern Song. This is indeed a fresh comparison, with a fresh Shen Gua standing out, no longer seen as a "scientific" Shen Gua one thousand years ago as many would promote before, but as an epistemological Shen Gua.

Secondly, in writing a history of knowledge, the author's strategy is "to use philosophical inquiry into the meaning of 'to know' as the linchpin to connect a range of empirical discussions concerning government, morality, science, and cosmology" (p. 11). Thus, when introducing Shen's various techniques and skills in his long and complicated careers, instead of just reporting the functions and achievements of those skills, SGE pays special attention to the epistemic practices and know-hows of Shen's famous skills. Based on up-to-date sinological and history of science researches on those skills and techniques, such as the Oblatory Epoch astronomical system (奉元

曆), the armillary sphere (渾儀), the gnomon (圭表), and the clepsydra (浮漏), plus a detailed introduction of Shen's divinational technique in forecasting weather called "Five Circulative Courses and Six Qi" (五運六氣, "Course-Qi" in short), SGE makes a number of rather good explications. Of special interests are SGE's detailed discussions of Shen Gua's "Course-Qi" technique, intimately connected with various Chinese correlative cosmological systems (pp. 84–93). They amply show that SGE is not simply introducing, again, Shen's "scientific techniques," but also happy to discuss a subject that conventional history of science research on Shen Gua would avoid or even dismiss as "superstitious." Thus, thinking in terms of the history of knowledge, yes, Shen's practice of the famous "Course-Qi" technique is a rather good story to tell in SGE.

The arrangement of the order of chapters in *Shen Gua's Empiricism* also shows a sensitive strategy in presenting Shen Gua. Instead of first highlighting his technical achievements (as a scientist) and then incorporating him into a broader discussion of literati culture such as Confucianism, SGE chooses to place Shen's thinking directly in the context of "learning" (p. 10). Thus, SGE is a complex account containing two intertwined narratives: the first narrative, encompassing Chapters 1, 3, 5, 6, and 8, chronologically discusses Shen's life experience as a scholar-official; and the second, comprising Chapters 2, 4, 7, 9, and 10, analyses his thinking. "Each chapter in the first narrative finds a correspondent section in the second, forming a 'life and thought' pair" (p. 19). This arrangement also from time to time sheds new lights on Shen's various thoughts and achievements in the *Mengxi bitan* 夢溪筆談 (hereinafter *Mengxi*) closely studied before by historians of Chinese science, by showing the tight couplings between Shen's ideas and techniques, and his synchronically corresponding careers and missions in the Northern Song. Furthermore, these tight couplings can also serve as bases for further studies of Shen Gua's techniques and ideas in the fashion of the historical sociology of (scientific) knowledge.

Now, having shown the merits and strengths of SGE as seen from this reviewer, let me proceed to the second part of my comments of this book. Generally speaking, I pretty much agree with Zuo's general outlook of the intellectual landscape of the Northern Song and also agree with her critical stance towards historical studies of Chinese science or knowledge as I wrote above. But regarding how to proceed from that general outlook, strategically and historically, I have my reservations and problems with *Shen Gua's Empiricism*, especially judging from Shen's most famous writing, *Mengxi bitan*, a *biji* 筆記 which I am most familiar with. In terms of history of knowledge, detailed discussions of Shen's knowledge and techniques in SGE are concentrated in Chapters 8, 9, and 10, properly covering the substantive materials of the *Mengxi*.

Basically, I have two general problems with SGE's analysis of the *Mengxi* and related materials, such as the *biji* of the Song. First, SGE's general distinction between builders of systems and nonsystems, and its individualistic characterization of the *Mengxi* as a nonsystem. Secondly, SGE's questionable characterization of Shen Gua as being driven by empirical "reliability," along with its emphases on the *Mengxi* or Shen's various empirical "methods." I instead suggest that we need to be much more serious about the two-tier epistemology in the *Mengxi*.¹ Thus, in the *Mengxi*, we need to avoid picturing Shen Gua as primarily an empiricist of "seeing and hearing" with no extended or wide-ranging interests in higher orders or in deep knowledge of the world.

First, the question of (total) system and nonsystem. Although SGE gives some accounts on some total systems of the Northern Song, e.g., those of Wang Anshi, Shao Yong, and even Su Shi, perhaps their systems are already familiar to contemporary Song scholars, SGE's accounts does not seem to me detailed and informative. I can understand why SGE calls Shao Yong's system a system, since there are specific ways to connect elements in Shao's correlative universe, but not quite so in the systems of Wang, Su, and the Cheng brothers. Actually, SGE's good account of Shen's "Course-Qi" is definitely a system as well, i.e., a medical system (jottings 134, 547)² in various ways connected with the correlative cosmology and human body, only perhaps not as total as Shao's numerology. But why does SGE like to define a system in such a general way like "a system is a total view," and for a Song thinker, "having a total view was to be able to contain and unify infinite particulars in the phenomenal world within a definite order" (pp. 132–33), hence to the effect of ignoring many sub- or local systems which actually play important roles in Song's history of knowledge? Subsystems in this sense are plenty in the *Mengxi*, such as the "Course-Qi," "incorporation of pitch names" (*nayin* 納音, jotting 103), "methods of sorting out stalks" (*sheshi* 揲蓍, jotting 551), and the likes. On the other hand, Shen Guo's outlook of knowledge was said to be a nonsystem, and in his *Mengxi*, Shen was said to be building a nonsystem. But how could Shen be famously building something which is not something else? According to SGE, what Shen was actually building was a *biji* (notebook), with 17 categories and containing over 500 jottings or items (originally 507 and later expanded to 609 jottings). And this *biji*, *Mengxi bitan*, for SGE, was nothing but an assemblage of "nuggets of knowledge." Each item or nugget "asserted independence and completeness for the content it contained, and no item

¹ Empirical dimension as bases, but with a higher dimension of subtlety. More later.

² I have followed Hu Daojing's 胡道靜 jotting numbers in his *Xinjiaozheng Mengxi bitan* 新校正夢溪筆談 (Beijing: Zhonghua shuju, 1957, and later editions).

claimed systematic connection with another” (p. 165). Therefore, in SGE’s world of Song knowledge, there are only two noticeable entities: total systems and independent nuggets which are conveniently assembled in those nonsystem kind of *biji*.

Hence, although there are 17 categories firmly divided 507 jottings by Shen Gua in the *Mengxi*, SGE chooses to ignore the epistemic meanings of these categories. In short, for Ya Zuo, the *Mengxi* is a structureless assemble of nuggets. By ignoring the epistemic importance of these categories, SGE’s way of treating the *Mengxi* is ironically reminiscent of traditional ways of treating the *Mengxi* as an assemble of discrete jottings where a researcher can pick (or avoid) any jotting in order to discuss its scientific values. SGE does not consider the specific meanings of categories important, dismisses the taxonomic structure of many Chinese encyclopaedias (or “collectanea”) as lacking intellectual voices, and emphasizes the *Mengxi* as featuring “a fiercely original single authorship” (p. 169). But surely the *Mengxi* contains many jottings that can only be strangely called “authored by Shen Gua” or we can question the vague notion of authorship here; moreover, Shen Gua, along with a few quite original compilers of encyclopaedia, were also authors of a higher level, i.e., architects in developing and deepening knowledge taxonomies and categories, as witnessed by historians like Hoyt Cleveland Tillman, Hohannes L. Kurz, and myself.

Concerning the meanings of categories in *biji*, there were quite a few earlier studies of the *Mengxi* and other similar writings that had paid special attention to the specific categories whose guidance is important to understand specific jottings within the category in question. Studies done by Fu Daiwie 傅大為 and by Lei Hsiang-lin 雷祥麟, and to a lesser extent by Dagmar Schäfer, Chu Pingyi 祝平一, Li Choying 李卓穎, and Xiao Shihui 蕭世輝 had all endorsed the significance of epistemic meanings of categories in *biji* or other writings.³ The relation of many jottings within a single category was often characterized by a “similarity relationship” like Shen had remarked in jotting 364 of *Mengxi* “If things resemble each other, they must be of the same kind/category” (物有相似者，必自是一類), a similarity relationship recognized by Shen but needed to be learned and discovered by historians. To my knowledge, five categories and most jottings in them in *Mengxi* had been carefully studied, like category “Divine Marvels” (*shenqi* 神奇) with jottings similar to Buddhist sacred marvels, category “Strange Occurrences” (*yishi* 異事) with similar jottings in describing the phenomena of “change” (*bianhua* 變化), “Notes on Marginalities or Unorthodoxies”

³ The author of SGE, Ya Zuo, had also done a somewhat similar work on the category of “Technical and Artful Skills” of the *Mengxi bitan*, published in *East Asian Science, Technology and Society* 4, no. 2 (June 2010), pp. 255–73, as “The Production of Written Knowledge under the Rubric of *Jiyi*.” But curiously, she had decided not to mention her own related work of the *Mengxi* in SGE.

(*zazhi* 雜誌) with similar jottings in expressing marginalities, and, to a certain extent, categories “Technical and Artful Skills” (*jiyi* 技藝) and “Calligraphy and Painting” (*shuhua* 書畫) with jottings similar in mutual echoing a two-tier description of learning. Certainly, more categories are to be studied in these fashions. Through this research orientation, deeper meanings of specific jottings in the *Mengxi* had been revealed and also shedded new and different lights on conventional studies in history of Chinese science, for examples, Shen Gua’s knowledge of “fossils” (jotting 373 in the category of “Strange Occurrences”), his supposed discoveries of “magnetic declination” (jotting 437 in the category of “Notes on Marginalities or Unorthodoxies”), his inspired analogical reflections on “six Qi matched with six Shen” (六氣配以六神) (jotting 136 in the category of “Numerological Regularities” [*xiangshu* 象數]), and his intensive studies of a two-tier structure of art learning in the category of “Calligraphy and Painting.”

Let me backtrack to the problem of a structureless *Mengxi* as an assemble of nuggets. The way SGE deals with this bag of nuggets is to make a general philosophical analysis of them, through the notions of “method and reliability,” in order to characterize every nugget by these notions. After defining that Shen Gua was building a nonsystem in the *Mengxi*, SGE evokes a more positive term for Shen: to see him as a reliability seeker. SGE then proceeds to inform us that there were a few good seekers of this kind in the Song and were later rediscovered by scholars in Qing’s evidential school, and Shen’s *Mengxi bitan* was thus hailed as one of the three major Song notebooks, along with Hong Mai’s 洪邁 *Rongzhai suibi* 容齋隨筆 (Tolerant Studio random notes) and Wang Yinglin’s 王應麟 *Kunxue jiwen* 困學紀聞 (Observations culled from arduous study).

In *Shen Gua’s Empiricism*, therefore, a number of “methods” are listed and discussed for the *Mengxi* (pp. 179–85): using reliable precedents to ground new knowledge (in the first category “Precedents” [*gushu* 故事]), “Identification and Verification” (*bianzheng* 辯證, supposedly in category two), then the methods of employment of (systematic) sensory perception and good reasoning (including logic, causation), and, later in Chapter 10, more methods including Shen’s practice of “to know”—a nascent division between subject and object, but also including Shen’s heart-mind capacity while practising divination. Here I will first comment on the two methods that are overlapped with the first two formal categories of the *Mengxi*. Thus, instead of an assemble of nuggets, SGE, after all, still recognizes a few categories directly as methods. SGE’s discussion of the first category of “Precedents” (I elsewhere translated as “Former Court Practices”) is interesting, but very brief. It is, however, not clear how many jottings in this category can be understood this way. For example, some precedents are not valid and dropped later (jotting 21), whereas other precedents were for old environment and new practice was designed for new

situations (jotting 22), and there are many more complications. A full study of this category and its 36 jottings, it seems to me, is needed before we can be sure of its meaning. As for the second method overlapped with category two, “Identification and Verification” (elsewhere I translated as “Criticism of Words and Things”), SGE stresses the importance of correctly matching a thing with its name. But I think it is more complicated than that. In the case of Wu-Xian River (巫咸河, or perhaps associated as “a river with no salt,” jotting 50), Shen just indicated that the name was a groundless association, but an association nevertheless describing the surface phenomenon. As for the famous jotting 44 on *ge*-technique or theory (格術), Shen did not tell where he got this name but directly interpreted *ge* as *ai* 礙 (obstruction), and furthermore, he used a brilliant analogical method to show how a theory of obstruction can be applied in three or four areas: burning mirror images, camera obscura, the situation of a rowlock conditioning the inverse relations of the two ends of an oar, and the fact that humans are often obstructed by things and their interests, and so the status of things and humans are often reversed. So here do we have four or three things (or rather one thing) matching one interpreted name or theory?⁴ Again, a fuller study of the second category of the *Mengxi* is needed.

As for a number of other more common “methods” (from sensory perception to good reasoning) listed in SGE, they are too general and do not seem very informative, I am afraid to say. This is symptomatic when, by ignoring categories and taxonomy, we cannot but use a small number of “methods” to characterize over five hundred jottings. Let us take one example slightly discussed by SGE: the technique of finding the volume with interstices (*xiji shu* 隙積術, jotting 301 in the category “Technical and Artful Skills”). The method “good reasoning” then is supposed to characterize Shen Gua’s *xiji* technique which is “the calculation of the frustum of a solid rectangular pyramid with stacked articles.” But this is not informative at all even if in mathematics SGE clarifies good reasoning as “precise and logical quantitative thinking” (p. 183). Actually, the problem of *xiji* was a difficult one even for people familiar with ancient Chinese mathematics, and the key question is how Shen Gua solved it. Remember, Shen Gua himself at the end of the jotting had proudly announced this as a technique of “constructing subtleties” (造微之術). In jotting 301, Shen’s first step seems to be locating or contextualizing his *xiji* technique within the Chinese geometrical tradition (算術求積尺之法), but then, as studied by Andrea

⁴ Shen Gua did not know that the logic of burning mirror images is different from that of camera obscura until Zhao Youqin 趙友欽 (early fourteenth century) invented an independent theory for the latter. See Daiwie Fu’s “Crossing Taxonomies and Boundaries: A Critical Note on Comparative History of Science and Zhao Youqin’s ‘Optics,’” *Taiwanese Journal for Philosophy and History of Science* 8 (1996–1997), pp. 103–27.

Bréard, Shen made a few “revision and syntheses” of that tradition in order to solve this new problem which had not been recorded in ancient texts. Therefore, only these revision and syntheses subtly constructed and proposed by Shen Gua himself, and not simply ordinary good reasoning, deserve the category of “Technical and Artful Skills” and the status of “subtlety” in the *Mengxi bitan*.

Now in Chapter 10 of SGE, “Farewell to System,” there are some more subtle “methods” (pp. 216–22) used in the *Mengxi* as indicated above: Shen’s practice of “to know” and his heart-mind capacity while practising divination. There is a good discussion there on how Shen Gua defined “to know” something, and that is a radical departure from one mainstream system (the two Cheng brothers’ heart-mind discourse) in which there is no ontological division between subject and object. But for Shen, “the name of a ‘thing’ served as a semantic medium that connected the ‘thing’ (object) to him (the subject)” (pp. 217–18). Also for him, “to know” was an experience that “required the knower to be present at the occurrence of the event” (p. 220). Therefore, Shen’s method of “to know” here signals the “nascent division between subject and object” (p. 216), hence the rise of subjectivity. SGE then gives a good discussion, via jotting 551, of why “fore-knowledge” (*qianzhi* 前知) should be categorically separated from “knowledge” (*zhi* 知) as they are conceptually incompatible. To be sure, a fuller analysis of how Shen Gua was said “to know” something in the *Mengxi* is needed, and jottings contrary to SGE’s interpretation are not difficult to find.

Though beautifully written around this topic in *Shen Gua’s Empiricism*, more questions can be raised in a wider scope. It is not clear whether the discourse of ontologically undivided whole of the Cheng brothers or Shao Yong was historically developed prior to Shen Gua, where a nascent division of subject and object occurred only later, and whether this was only an ontological development of the Northern Song? In the end, however, SGE still has to admit that Shen Gua in certain contexts also embraced the utility of the heart-mind discourse and acknowledged its connections with deep orders, hence the division of subject and object closes again: at least in practising divination and in discussing the insufficiency of calendrical systems. In any case, SGE strives to contain these talks of higher orders in the *Mengxi* to “segregated, special niches” only, whereas Shen’s method of sensory knowing “claimed pervasive utility and validity” (p. 221). However, is this really true of the *Mengxi bitan*? Did Shen Gua in the *Mengxi* subscribe to “an epistemology driven by the pursuit of reliability” (p. 186)? I believe this is clearly an exaggeration and obscuring another important dimension of the *Mengxi*.

In the seventeen categories of the *Mengxi*, does Shen Gua’s discussion of higher orders locate only in the category of “Numerological Regularities,” where various divinations (like his Course-Qi system) and calendrical systems were discussed? Even in category of “Technical and Artful Skills,” Shen had proudly considered his technique

of interstices *xiji* as a technique of “constructing subtlety,” as I discussed earlier. Along with legendary calendrical practices in Wei Pu 衛樸, or about the heart-mind discernment (得之於心, jotting 314) beyond medical texts realized by Shen himself, “subtlety” (*wei* 微) is surely a way to higher orders in this category. As I understood of Shen Gua, almost every kind of technique or learning has its bases in observation and computation, but each of them also has its higher dimension in terms of subtlety and heart-mind. This is, I think, the general two-tier epistemological position of Shen. And this is so for at least half of *Mengxi*’s 17 categories, with an exceptional category of “Divine Marvels,” which is reserved only for the Sacred that no (divinational) computation or persistent efforts can achieve.

Let me elaborate more on this point in this review. To a lesser extent than category “Divine Marvels,” equally unlearnable for ordinary people, some types of characters or nobilities embodied in a few Song literati who were able to foretell other literati’s career fortunes were also reported in the category of “Literati’s Characters” (*renshi* 人事). There, those high literati with the ability to prophesy were the privileged “noble men” (*guiren* 貴人), who were different from “men practising techniques” (*shushi* 術士), and sometimes Shen cryptically explained their ability of prophecy by simply asserting that those noble men had seen people a lot. Moreover, in the category “Calligraphy and Painting,” Shen’s two-tier theory of learning is also clear. Over and above craftsmanship, a higher dimension exists in painting and calligraphy, where common artisans were ignorant but gifted literati would excel. In commenting on Wang Wei’s 王維 painting, *Yuan An woxue tu* 袁安臥雪圖 (Yuan An repose on the snow), where Yuan An was lying on the snow with banana trees growing beside it (jotting 280), though contrary to common sense, Shen praised Wang for “constructing an idea that advances into the realm of divine” (造理入神). Similar discussions of advancements are many in Shen’s reports of marvellous Song “literati paintings” by Song Di 宋迪, Xu Xi 徐熙, Dong Yuan 董源, and so on. But we cannot skip the basic craftsmanship for a quick advancement. In commenting on the learning procedure of calligraphy, Shen wrote in jotting 564 that the realm of “divine” could not be open to those calligraphers who had not faithfully and exhaustively copied the famous calligraphy models set up by the ancients. Only by passing this road of “slavish calligraphy” (*nushu* 奴書) can we set foot on the realm of wonder and divine (過此一路，乃涉妙境，無跡可窺，然後入神). We can see similar ideas in the category of “Culture and Criticism of *Wen*” (*yiwen* 藝文). Like Shen’s subtle technique of calculating interstices in the category “Technical and Artful Skills,” he also praised the highest state in the learning of Chinese phonology and the techniques in composing regulated poems (*lüshi* 律詩) as something that is potentially endowed with the capacity of “constructing subtleties” (e.g., jottings 252, 263). And, not surprisingly, we can easily find in the category “Musical Harmonics” (*yuelü* 樂

律) discussions (jottings 82, 100) on how, by learning from dynastic ritual music in antiquity concerning 6, 8, and 9 musical transformations (樂六變、樂八變、樂九變), we human can pay sincerest respects to gods above in heaven and down on earth, and to humans and their ancestral ghosts. Only after deep searches and hard studies can all of these “heavenly order that cannot be changed” (天理不可易者) be known. Finally, consider the category “Precious Artifacts” (*qiyong* 器用). In addition to quite a few excavated precious or foreign artefacts/relics recorded or even studied by Shen Gua, he also wrote about two special artefacts. One is an antique sign *Feilian* 飛廉 (jotting 319), supposedly the name of a divine beast that Shen had no knowledge of. But he believed that an ancient sign like this must have deep meaning that could foresee good and evils and regretted that he could not thoroughly study its reason (恨未能深究其理). The other is a most famous chariot of a Tang emperor (大駕玉輅, jotting 337), perfectly built and superior to any imperial chariot later built by all the best Northern Song artisans. But for all the artisans/builders in Song’s time, the technique for building that divine chariot could never be revealed (歷世不能窺其法).

In the end, I have to largely skip SGE’s Chapter 11, “Reverberating in the World (1100–1800),” before making this review too long. Maybe two sentences would suffice to make a brief comment of this chapter. Concerning the readership or reverberations of the *Mengxi*, instead of a chapter discussing the (imagined) community of *biji* in the Song and perhaps even later, SGE chooses to look for a small group of “reliability seekers,” which is not a historical (or actor’s) category, like *biji* or encyclopaedia, but the analyst’s (or author’s) own category. The idea is interesting, but much more research is needed before it can be convincing.

The last merit of this book, *Shen Gua’s Empiricism*, is its boldness in stressing a (historical) epistemological/philosophical viewpoint, which I think runs counter to most historical studies of Shen Gua and his *Mengxi bitan*. Instead of simply adding up recent research results on our understanding of Shen Gua, it has chosen to stimulate thoughts and provoke argumentations. A very interesting and important book to read and enjoy.

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