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ORIGINAL RESEARCH PAPER

The Chinese Context and Future Directions in Philosophy of Engineering: An Interview with Li Bocong

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Abstract Professor Li Bocong's philosophical works embody Chinese society's intellectual reflection on its technological, economic and social modernisation. Drawing on classical Chinese philosophy, the Chinese interpretation of Marxism and dialogue with other Western philosophical traditions, he has formulated a research programme in the philosophy of engineering and stimulated the emergence of an independent national school of thought. In the past decades, generations of Chinese philosophers and social scientists have further developed his approach and understanding of engineering as a special field of human practice that is of central importance to today's societies. In the interview conducted with Professor Li Bocong in May 2025, we discuss his personal and intellectual biography, his inspirations from traditional Chinese culture, his reflections on the concepts of science, technology and engineering in the East and West and their intellectual exchange, his understanding of human action, creativity and rationality and their manifestations in engineering; the socio-technical transformations in today's China, the dialectic of the global and the local in socio-technical development, and the principles of philosophical life.

Keywords Engineering Science · Philosophy of Engineering · Philosophy of Science · Philosophy of Technology · Engineering Studies

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Introduction

Since the 1980 s, Professor Li Bocong has been developing a research program in the philosophy of engineering, which reflects the significance of engineering activity in post-reform China. Generations of philosophers, social scientists, and engineers have been influenced by his work, forming an academic community, united by a shared understanding of the subject and agenda. His works synthesize ancient Chinese thought with classical and contemporary Western philosophy, as well as with contemporary research in the social sciences and humanities globally. In 2025, he was honored with the Lifetime Achievement Award from the Society for Philosophy and Technology in recognition of his original contributions to the

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philosophy of engineering and his efforts to promote cross-cultural dialogue in the field.

Philosophy of Engineering in the Chinese Context

A few principles of Li Bocong's work can be regarded as a distinctly Chinese contribution to the philosophical discourse on engineering.

First, he established the autonomy of the philosophy of engineering on the basis of the triad of science, technology, and engineering as mutually interconnected yet irreducible domains of human activity. On the one hand, it challenged the long-dominant monistic approach, which reduced technology and engineering to the mere application of scientific knowledge and elevated the philosophy of science within the European tradition. On the other hand, it rejected the dualism of science and technology, which placed engineering activity in subordinate position to the latter and often resulted in alarmist or fatalistic philosophies of technology. In Chinese language, the terms "science" (科学 kēxué), "technology" (技术 jìshù) and "engineering" (工程 gōngchéng) do not have the specific Western connotations, inherited from Greek and Latin languages. Chinese notions of science and technology, for example, relate as "disciplinary study" and "technique", which helps to avoid falling into a logocentric conception of technology. The Chinese notion of engineering, in its turn, is close to "project" or "construction", accentuating collective activity, in contrast to the Western accent on the individual ideas ("ingenuity"). Li Bocong's theory moves beyond these etymological associations, substantiating the distinction between science, technology, and engineering in terms of their respective goals (discovery, invention and creation), as well as norms, institutions, communities, efficacy criteria, modes of thinking, and other characteristics. Beginning in the 1980s, he worked on the specific nature of engineering theory and practice, rationality and making. In 1992, he presented a report "On Engineering Realism" in English, subsequently published as a paper in the journal *"Studies in Dialectics of Nature* in Chinese [1]—precisely at a time when the philosophy of engineering was emerging, yet fragmentarily, in the West [2]. His work culminated in the publication of his seminal monograph, "I Create, Therefore I Am: Introduction to the Philosophy of Engineering" [3, 4], demarcating the specific subject and agenda of this field.

Secondly, Li Bocong's work is following the Marxist paradigm of "dialectics of nature" – a systematic view on relations between human societies and their environment. Methodologically, it implies a close interaction between philosophy and empirical studies of science, technology, and engineering. Philosophical inquiry is both guiding STS and drawing on them, instead of falling into isolated theoretisation. Li Bocong's philosophy of engineering is a transdisciplinary project, developing hand in hand with philosophy of economy and production, with contributions from sociology and history, organization studies and economics, psychology and cognitive science [4–6]. His efforts helped institutionalize the interdisciplinary studies of engineering in China, such as in the foundation of the Center for the Research of Engineering and Society at the University of Chinese Academy of Sciences in 2003, the establishment of the journal *Engineering Studies: Engineering in Interdisciplinary Perspectives* in 2004, and the establishment of the Society for the Sociology of Engineering of Chinese Society for the History of Science and Technology and the Society for the History of Engineering of Chinese Sociological Association in 2014.

On the ontological level, a dialectical approach to engineering activity regards it as a complex and highly reflexive form of human praxis - a process of bringing forth novelty through rational calculation and creative imagination, communication, cooperation, and organization. The individual and collective goals and efforts are synchronized in an "activity community" of an engineering project – engineers, management, workers, etc. Their activity is directed by the social needs and historical situation, linking theory and practice, idea and action, possibility and realization. Starting from the "Outline for the Theory of the Artificial" [7], the significance of practice-oriented philosophy has been consistently emphasized in the works of Li Bocong, in accordance with the Marxist principle of changing the world, not merely interpreting it. His motto "I create, therefore I am" reaches beyond the domain of the philosophy of engineering, shaping a philosophical anthropology that stands in opposition to the knowledge-centric worldview of the Cartesian subject.

Finally, the unprecedented intensity of the dialogue between the communities of humanists and engineers, which was fostered by Li Bocong, is characteristic of the organization of contemporary Chinese society. Born in 1941, Li Bocong has witnessed the formation of a unique modernization path by the People's Republic of China. The combination of planning and experimentation in the social, economic and technological developments is central to Chinese "reflexive modernity". From bioengineering to urban planning, and from the everyday consumption to infrastructural megaprojects, the problems of the technologization of life have required systematic collaboration between social and engineering sciences. For Li Bocong, "non-technological" elements constitute central, rather than peripheral, components of engineering praxis, which is oriented by political, economic, ethical, and environmental considerations. On the conceptual level, he extends engineering beyond the process of design, which has received most attention in Western academic literature [8]: the process of making and indwelling the human-made world includes planning and decision-making, implementation and operation, and using and living. Beyond these stages, the engineering process can be examined at the micro-, meso-, and macro-levels [9] – from the individual projects and enterprises to national and global developments, linking the empirical studies of concrete practices with social and political philosophy. This holistic and systems-oriented framework has developed in cooperation with the engineering community. The workshops and conferences in philosophy of engineering have been supported by Chinese Academy of Engineering (CAE) since 2004, and, after the establishment of the Chinese Society for Philosophy of Engineering, the systematic research and case studies have been collaboratively conducted by engineers and philosophers on the frontiers of technological development [10]. In the last years, Li Bocong and his colleagues developed a paradigm of "engineering ecology", which is aimed to diagnose and predict "healthy" and "pathological" scenarios on the different levels of socio-technical systems [11]. The ecological metaphors are used to grasp the complexity of engineering networks, consisting of heterogeneous elements, which are in dynamic processes of cooperation and competition, emergence and evolution, inheritance and innovation. This approach characterizes engineering ecosystems as open and evolving, where structural–functional analysis should include temporal dimension and hierarchy of levels, similarly to the methods of life sciences. It accentuates the possibilities and limitation of control and prediction - the constructiveness and autonomy of socio-technical developments. The engineering ecological framework can inform engineering ethics, the field of Technology Assessment, and responsible research and innovation (RRI), and it implies a specific "ethics of coordination" beyond specific professional responsibilities and legal regulations.

In the interview conducted with Professor Li Bocong in May 2025, we discuss his personal and intellectual biography, his inspirations from traditional Chinese culture, his reflections on the concepts of science, technology and engineering in the East and West and their intellectual exchange, his understanding of human action, creativity and rationality and their manifestations in engineering; the socio-technical transformations in today's China, the dialectic of the global and the local in socio-technical development, and the principles of philosophical life.

Interview with Li Bocong

Q1: A scholar's thoughts are often better understood when considered alongside their life background. Therefore, could you share with us some of your life experiences and your life trajectory beyond academic pursuits?

Li: I am now over eighty years old, and the social and historical storms of these years have inevitably left a deep imprint and profound influence on my life experiences.

I was born into an intellectual family; both my parents were teachers. From a very young age, I particularly loved reading, and I had an advantage in this regard, because my father – a famous Chinese teacher in Henan province - often took me to the libraries of the schools where he worked. The scope of my reading was exceptionally broad among my peers - I unintentionally embarked very early on a path of interdisciplinary reading. It could lead to being mediocre in every field, but might also open new directions.

Among my contemporaries, I was one of the few with a relatively complete educational experience - I attended primary school, secondary school, university, and studied as a postgraduate (Master's degree). However, my educational process was not continuous

- in middle school, I was affected by a political movement in 1957 and received a disciplinary punishment, which had a profound impact on my entire life. When applying for universities, despite excellent academic performance, I could only be admitted to a coalfield geology vocational college.However, it was a very strong teaching faculty, including graduates from prestigious universitiesand even those who had returned from studying abroad. The breadth and intensity of the curriculum were remarkable, including foundational STEM subjects like advanced mathematics, general physics, general chemistry, electrical engineering, theoretical mechanics, strength of materials, analytical chemistry, as well as specialized courses like general geology, mineralogy, surveying, and mechanical drawing.

In 1959, I became a Chinese language teacher, and, after teaching for three years, I took the university entrance exams again and went to study in the Chinese Department of Kaifeng Normal College (the current Henan University). From 1962 to 1964, I was ambitiously determined to achieve something in the field of literary theory research, but at that time, pursuing academic research in the field of social sciences was considered hopeless. I workedas a secondary school teacher in an ordinary county town in Henan Province for about twelve years.At that time, within the atmosphere of the Cultural Revolution, society widely believed that knowledge was useless, and intellectuals generally neglected their studies. However, I still firmly believed that China needed intellectuals, that the country needed people to pioneer new directions in the theoretical field.

Therefore, while working as a teacher, I devoted considerable effort to self-study “in secret” – the history of Traditional Chinese Medicine and research on the theoretical integration of Chinese and Western medicine. Having built a foundation in biology, I successfully passed the postgraduate entrance examinations in 1978 to the Graduate School of the Chinese Academy of Sciences (now the University of Chinese Academy of Sciences), majoring in the Dialectics of Nature (Philosophy of Science and Technology). I studied many science and technology courses, including Cytology, Genetics, etc., which laid a relatively solid foundation in scientific and technological knowledge. After postgraduate course, I continued working at the same university – an immensely different environment than being a secondary school teacher in a province.

In a specific narrative sense, my life experience is simple – either studying or teaching. However, due to various opportunities, I had many special chances to understand society. This refers to my participation during university, due to unique historical circumstances, as a work team member in the 1964 “Socialist Education Movement” and the 1965 “Four Cleanups Movement,” when I was selected as an assistant by a senior official. This provided me with a deeper understanding of the actual conditions in Chinese society and the multifaceted realities of members of society across various levels. Without this deep experience of social reality, I might have later pursued a research path in the philosophy of technology and engineering that was more of an academic, “book-based” approach, rather than being able to embark on the "engineering site” approach imbued with the scent of earth and social dynamics.Although my formal education path can be considered complete, I personally believe that I am largely self-taught; I cultivated the lifelong “habit” of self-study.

Q2: How does your academic journey relate to the personal experiences you just shared?

Li: My academic journey has been a rather winding path, due to external circumstances beyond my control. As I mentioned before, initially, I aspired to make achievements in literary theory and devoted considerable effort to it. I once selected 100 Chinese and foreign short stories for analysis, attempting to deduce the artistic principles governing short stories from them (in retrospect, this approach was akin to the methodology used in natural science research). Later, due to societal conditions, I had to change course, and I chose the philosophy and history of Traditional Chinese Medicine (TCM). For more than tenyears, I expended great effort in both ancient and modern TCM. The initial focus of my master’s thesis was TCM methodology, and I had already achieved some results in reinterpreting TCM theory using computer methods. While reviewing the intellectual history of TCM methodology and re-examining ancient documents, I concluded that the earliest school in ancient China was not the Yellow Emperor School, but the Bian Que School, which overturned the traditional view on TCM history. This was affirmed by the great TCM teacher –and my master's thesis supervisor –Ren Yingqiu, and also highly praised by the renowned American historian of medicine, Nathan Sivin. Although my views received little appreciation initially, the 2012 excavation from the Han dynasty tombs in Chengdu provided corroboration for my research conclusions. This became something that greatly surprised me while also bringing me immense satisfaction.

At the Graduate School of the Chinese Academy of Sciences, my research focus shifted towards the philosophy of science and technology. Since I was also reading many works on management science, the combination of these two areas led me onto the path of exploring the philosophy of engineering. After nearly a decade of work, I published"An Outline of the Theory of the Artificial – A Philosophy of Creation" [1] in 1988. It was a relatively short text, but it can be said to have offered a completely new perspective. I wanted to expand and deepen it into a more substantial academic work. However, after discussing the philosophical issues of planning and design, I felt unable to delve deeper into the philosophical issues of operations, institutions, and implementation, so the writing process was interrupted. For about the next ten years, I primarily researched many issues in the philosophy of economics and STS, reading extensively in institutional economics, evolutionary economics, and technological innovation. Later, feeling that my ideas had achieved certain coherence, I finally published"Introduction to the Philosophy of Engineering: I Create, Therefore I Am" in 2002 [2].

This book proposed to see science, technology, and engineering as a triad, which laid a theoretical foundation for the status of the philosophy of engineering as a philosophical sub-discipline. However, the final chapter explicitly states that the philosophy of engineering is not merely a philosophical branch; essentially, it is holistic"philosophy itself". Engineering activities are processes of producing the artificial; they are changing the world. Engineering activities comprise three stages: planning and design, operations and implementation, and the stage of using artifacts in life. Activities in these three stages involve a series of important philosophical concepts, such as planning/design, initial conditions, boundary conditions, decision-making, materials, institutions, operations, procedures, rules, rule-following, product quality, waste products, using artifacts, free will, and realms of life. Many of these concepts have been neglected by previous philosophers.

After the publication of this book, I had the opportunity to collaborate closely with some members of the Chinese Academy of Engineering, particularly academician Yin Ruiyu, then Director of the Division of Engineering Management. Supported by the Division of Engineering Management of the Chinese Academy of Engineering, we continuously initiated research projects on the philosophy of engineering since 2004 without interruption for over twenty years, successively publishing"Philosophy of Engineering" [3] (1^{st}-4^{th}editions),"The Theory of Engineering Evolution" [4],"The methodology of Engineering" [5], and "The Theory of Engineering Knowledge" [6]. These works expound a theoretical system for the philosophy of engineering comprising the "Five Theories": the triad theory of science, technology, and engineering; engineering ontology; engineering methodology; engineering epistemology; and the theory of engineering evolution.

Engineering ontology posits that engineering is a direct, real productive force; engineering activities are the material foundation for the existence and development of human society; engineering activities involve not only productive forces but also production relations and all aspects of society. This view is the core of the "Five Theories of Engineering Philosophy".

Scientific methodology is a methodology for pursuing "truth", whereas engineering methodology is a methodology for pursuing "excellence". With "pursuing truth" as its aim and standard, scientific methodology does not allow compromise or concession. In contrast, how to reasonably balance many conflicting engineering requirements becomes a core methodological principle in engineering activities.

A core content and manifestation of engineering knowledge is design, which is not concerned with or discussed in scientific epistemology. The object of discovery existed before it was discovered,whereas the object of design does not exist before the design. Although the external natural world is holistic, scientists conduct scientific research from the perspective of natural science disciplines, using a disciplinary analytical approach. Engineering activitiesare integrative activities; they are the integration of technical and non-technical elements, methods and knowledge. It can be said that the success or failure of integration determines the success or failure of engineering.

Besides engineering methodology and engineering epistemology, there is also the theory of engineering evolution. The history of engineering is as long as human history, spanning three million years, while the history of science is at most a few thousand years old. Saying that engineering is the application of science is clearly untenable. The laws of engineering evolution should be an independent issue.

Looking back, the collaboration over the last twenty to thirty years with several members of the Division of Engineering Management of the Chinese Academy of Engineering has been a rare and valuable opportunity. In the engineering community, many believe that engineering does not need philosophy; in the philosophy community, very few prioritize researching the philosophical issues of engineering. In the introduction to"Cybernetics" [7], Norbert Wiener discussed how people from different disciplines and professions can learn from and cooperate with each other, and the importance of such mutual learning and cooperation. I believe that the in-depth development of the philosophy of engineering must rely on the combination of both philosophers and engineers, and the conditions for this combination are not easily met. It is through the continuous process of mutual learning and deepening cooperation that some members of the Chinese Academy of Engineering and some teachers at the University of Chinese Academy of Sciences have continuously gained new understandings and made new progress.

Q3: You studied geology for a year in the past and later Chinese at Hebei University. You researched the philosophy of TCM and later shifted to philosophy of engineering. What is the intrinsic connection between them?

Li: I had a solid grounding in science subjects in high school. I intensively studied science and engineering courses for a year at a geology college and became familiar with and could understand the thinking patterns and characteristics of STEM fields. For example, when researching TCM methodology, my initial focus was on whether it was possible to link TCM theory and literature with computer methods. Studying Chinese in university equipped me with the ability to study classical Chinese texts, which was a necessary condition for my later research into TCM history and methodology. It must be admitted that many modern Chinese scholars, due to insufficient knowledge and ability in classical Chinese, find it difficult to truly enter the inner depths of traditional Chinese philosophical thought, only skimming the surface. Understanding of traditional Chinese philosophical thoughtbecame a favorable and powerful condition for me to enter and delve deeply into the field of engineering philosophy research.

Ancient China had glorious achievements in the field of science and technology. However, after the 'modern scientific system' was established, the ancient Chinese scientific systems successively merged into it– for instance, there is no longer an (independent)'Chinese mathematics'. However, after modern Western medicine was introduced to China, following a tortuous course and fierce contention, the TCM system did not perish, which made it the only remaining fruit from ancient China's science and technology system that has continued to this day, which can be called a miracle in the history of science and technology.

A characteristic of Chinese medicine is its rich medical philosophical thought. Since the 1960s, TCM has been one of my consistent theoretical, historical, and academic focuses. Although I have not acquainted many people in TCM circles, I was fortunate enough to have connections with three "top figures" in modern TCM: my master's thesis supervisor Ren Yingqiu; Lu Guangshen, one of China's first batch of National TCM Masters (30 people nationwide), and the Nobel Prize winner Tu Youyou. Even after shifting my research focus to the philosophy of science, technology, and engineering, I never interrupted my attention to the philosophy of medicine.

In modern TCM –and even the entire field of modern Chinese medicine–,artemisinin is one of the most significant achievements. In 2005, my doctoral student Zhang Wenhufocused on Tu Youyouand artemisinin as the theme of his doctoral dissertation. I visited Tu Youyou in her laboratory multiple times, conducting in-depth conversations and learning many unknown details and related materials. After understanding the exceptionally arduous, tortuous, and complex process of Tu Youyou's discovery and development of artemisinin, I felt the highest respect for her lofty spirit and noble character–because she encountered many obstacles beyond ordinary imagination. In 2010, a professor who opposed Tu Youyou even claimed that my guidance of students researching her work was a mistake. This false accusation naturally failed. By the end of that year, Zhang Wenhu's doctoral dissertation was successfully defended, with a clear statement that Tu Youyouachievements deserved the Nobel Prize. Although a single doctoral dissertation could not "terminate" the decades-long farce of those domestically opposing Tu Youyou, her formal receipt of the Nobel Prize in 2016 finally ended that farce.

Based on long-term reflection, I wrote in 2020 an article titled "The Three Dimensions of 'Medicine': 'Medicine' as Social Activity, Social Role, and Social Institution," [8] published in the *Journal of Engineering Studies*. In 2021, I wrote another article "The Dual 'Three-Dimensional Theory' of 'Medicine' and the Dual Meanings of 'Medical Engineering,'" [9] published in*Medicine& Philosophy*, expounding some of my views on the philosophy of engineering, philosophy of medicine, and TCM philosophy.

Medical care is an industry; being a doctor is a profession. Medical science academies and hospitals are completely different: the former addresses medical science problems, the latter addresses treatment of diseases. Therefore, doctors are not scientists but are more akin to engineers. The fact that the most outstanding doctors in hospitals can be elected as academicians of the Academy of Engineering itself illustrates the engineering attributes of medicine. In terms of semantic analysis and thinking patterns, I believe clinical thinking belongs to engineering thinking, not scientific thinking. Doctors diagnosing and treating patients deal with specific individuals; the process is a treatment process like solving engineering problems, not exploring physiological science questions. Similarly, pedagogy is a science, but the operation of schools is a (broadly defined) engineering activity. The past saying "Teachers are engineers of the human soul" has its rationale. In modern Chinese, 'engineering' often includes industry and agriculture, although they differ greatly. Technical practice, economic practice, educational practice, social practice, and political practice can all be analyzed within the framework of the philosophy of engineering.

Q4: Which Chinese and foreign thinkers have influenced you most profoundly?

Li: First, in the field of the philosophy of engineering, both an understanding and familiarity with engineering reality (including technology, economics, management) and the study and accumulation of traditional philosophical theory are indispensable. Theoretical reflection on the philosophy of engineering must primarily stem from reality, from the real problems arising from engineering practice – both historical and contemporary.

I also consider whether philosophers in history have pondered similar questions.In the Chinese version of "Introduction to the Philosophy of Engineering" [2], the first chapter is a review of the history of philosophy (this part was not translated in the English version). This chapter includes four sections, evaluating the relationship between the origins and development of the philosophy of engineering and some ancient European philosophers, ancient Chinese philosophers, modern philosophers, and contemporary philosophers respectively, briefly commenting on certain philosophical concepts of Plato, Aristotle, some Christian philosophers, Bacon, Descartes, Kant, China's Confucius, Mozi, Wang Yangming, and even Popper, Dewey, Piaget, among others.

Take Plato's 'Idea' as an example. On the one hand, from a modern perspective, if we apply Feng Youlan's method of philosophical research termed "developing further," one could consider the'Idea' to be closely related to the meanings of design and blueprintin engineering activities, and this (modern-colored) interpretationhas practical significance. On the other hand, studying the history of philosophy "explaining as it is", the interpretation certainly differs greatly from Plato's original meaning. Another example is how to retrospectively view Aristotle's theory of the four causes from the perspective of the philosophy of engineering, which is also an important and complex issue. In the Christian tradition, the 'Creator' refers to the God, who created the entire natural worldin one act, after which He rested and no longer engages in creating activities. Christian philosophers had many discussions about creation, about 'God's design'. Marxism holds that working people created the world (the world of artifacts), and humanity's activity of creating the world of artifacts must continue incessantly. In fact, many Chinese and foreign philosophers from ancient times to modern timestouched upon many issues of the philosophy of engineering. If we look back at the history of philosophy from this perspective, we will inevitably generate new analyses and interpretations.

However, few ancient or modern philosophers regarded production, labor, and engineering as important, fundamental philosophical issues. China's Mencius said: "Those who labor with their minds govern others; those who labor with their strength are governed by others". Since the philosophers belonged to the "class that labors with their minds," they could not possibly consider the labor performed by "those who labor with their strength" as primary theme of a philosophical theoretical system. This is the social reason why the philosophy of engineering failed to become a basic theme in the history of ancient philosophy.

Among the many philosophical sub-disciplines, the philosophy of engineering is most closely connected with the philosophy of technology. In the 1980s, the first National Conference on the Philosophy of Technology was held in China. Chen Changshu was the leading figure in the philosophy of technology in China, and I had close contact with him. Because of my interest in the philosophy of technology, I even wrote two articles for China's first philosophy of technology conference. In 1992, the first Sino-US STS Seminar was held at the Graduate School of the Chinese Academy of Sciences (now the University of Chinese Academy of Sciences). I was one of the main Chinese organizers. The conference invited Stephen H. Cutcliffe to lecture on STS and the history of technology, and Carl Mitcham to lecture on the philosophy of technology. Consequently, I also established close academic ties with these two American professors. In 1994, supported by the Wang Kuan Cheng Foundation, I went to Lehigh University in the USA as a visiting scholar. Not only did I have more interactions with these two American scholars, but I also had the opportunity to attend the 1994 SPT Biennial Conference in New York. Mitcham gave me copies of his"Thinking through Technology"and"Philosophy and Technology: Readings in the Philosophical Problems of Technology". His research on the historical development of the engineering tradition and the humanities tradition in the philosophy of technology has had a significant influence in China. Through this, I learned about Friedrich Dessauer's views and contributions. I paid particular attention not only to Dessauer's views on technological invention but also greatly admired Dessauer's proposal to add a fourth critique –a critique of technological making. I believe Dessauer's view provides a clear and grand direction for scholars in the philosophy of technology and the philosophy of engineering.

In researching the philosophy of engineering, we must attach great importance to the study of the history of philosophy concerning philosophical reflections on engineering activities, because this is an important intellectual resource neglected in previous histories of philosophy, and the excavation of these ideas and theoretical research is more difficult and more important. The current practice (engineering practice) has far surpassed the past in both breadth and depth. We must conduct new analyses of past understandings based on new practices, striving to propose new theoretical viewpoints.

Q5: Some argue that in Western civilization, technology is essentially not seen as a solution (Lösung) to material problems but as a means of salvation (Erlösung). Does this argument resonate with your philosophy of engineering and your integration of Western thought?

Li: The concept of salvation is rarely discussed in Chinese academia–except in the field of religious philosophy. But I have noted that the Christian understanding of labor is thought-provoking, including Weber's views, which also require new interpretation. I believe the Christian view of labor holds important enlightening significance for the philosophy of engineering. I have noticed a very important but often overlooked phenomenon in the history of ideas by many Chinese thinkers. Unlike many secular thinkers, politicians, and philosophers who severely disparage labor and the laboring masses, Christian doctrine and theory emphasize the importance of labor and the equal status of the laboring masses and the nobility. As I know very little about Christian thinking, I cannot clearly explain how this view and understanding relate to salvation. But I believe that in the field of philosophical theory and the history of philosophy, the significance and importance of Christianity's understanding of labor and laborers should be re-recognized and studied.

It is noteworthy that in China, the Chan (Zen) school of Buddhism, a Buddhist sect with Chinese characteristics, put forward the principle"no work, no food" and put it into practice. The Chan school advocated that "carrying water and chopping wood are themselves marvelous pursuits". This understanding and view of labor clearly requires new analysis and evaluation. Currently, there seems to be no evidence of intellectual connection between the views of Christianity and Chan Buddhism. That is to say, they independently proposed ideas emphasizing labor and valuing the laborer, each within their own religious systems and social environments. How to further understand and research these issues awaits the joint efforts of religious circles, philosophical circles, and relevant individuals.

Q6: In your view, what is the most important driving force for creativity in the field of engineering?

Li: Regarding the driving forces for engineering development, a relatively common understanding in China is that engineering originates primarily from the pull of social needs, that is, from the need to develop productive forces for a better life. On the other hand, science and technology play a propelling role in the development of productive forces. The transition from the discovery of electricity to its industrial application is a familiar example. Another typical example is that Einstein first proposed the theory of stimulated radiation, laying the theoretical foundation for laser technology.

In the past, talking about science often meant basic science. Now, we can more clearly divide science into two categories: one is basic natural science, and the other is engineering science. It is primarily engineering science, not basic natural science, that plays a more direct role in propelling engineering progress. I believe that what is called engineering science is the science concerning the laws of the manufacture and use of artifacts (e.g., engines, locomotives, airplanes, etc.). Of course, for promoting the development of productive forces, what is more direct than engineering science is technology. Science (including engineering science) must be transformed into technology to exert its effect on promoting productive forces; without technology as an intermediary, science cannot directly propel engineering development.

Q8: In your book "Introduction to the Philosophy of Engineering: I Create, Therefore I Am", you discussed the relationships between different types of rationality in engineering and the diversity of lifestyles, among other issues. In the Christian tradition, excessive curiosity is considered a vice, whereas in the scientific tradition, curiosity is a key virtue. Do you believe curiosity plays a special role in the engineering field, such as curiosity about new things?

Li: Although the importance of raising questions is well-known in the field of philosophy of science and general intellectual history, scholars often refer specifically to*scientific*problems when using the term 'problem,' emphasizing that the development of science relies on scientists posing and solving scientific problems. Now, we must recognize that scientific problems and engineering problems are two different types of problems. The driving force for scientists to pose scientific problems stems mainly from their curiosity, whereas the public neither cares about nor can pose scientific problems. In contrast, engineering problems arise primarily from social needs and the sense of responsibility to meet those needs, regardless of the scale of the engineering project. Therefore, for engineering, the core psychological driving force is firstly the sense of responsibility to develop the economy, meet social needs, and enhance people's well-being. Although curiosity might also play some role, it is not particularly important. Furthermore, in engineering activities, especially during the research and development(R&D) stage, curiosity does indeed play a certain role. However, the curiosity in engineering (e.g., curiosity about the marvels and consequences of new technologies) is still quite different from the curiosity in basic science (e.g., curiosity about phenomena like black holes or quantum entanglement). The distinction between these two types of curiosity has not yet received sufficient attention or concrete elaboration. It needs to be emphasized again that in engineering activities and engineering thinking, the role and influence of a sense of responsibility surpass that of curiosity.

Q9: Despite prevailing trends of globalization, does engineering practice itself still bear characteristics of one's native language? Compared to Western languages, have you discovered such characteristics in the syntax or semantics of the Chinese language? Is there a connection between Chinese aesthetics and contemporary Chinese technological practice?

Li: Some philosophers have already paid attention to the question of how different languages influence philosophical thinking and philosophical theory. Modern science, technology, and engineering all originated first in the West. Disciplines like the philosophy of science and philosophy of technology also originated in the West. So, why didEurope and America not develop the philosophy of engineering more quickly? I believe that in this regard, the Chinese native language provides special convenience.

The Chinese term '工程' (gongcheng) is usually translated into English as 'engineering'. Both the Chinese 'gongcheng' and the English 'engineering' are polysemous words. A more detailed analysis cannot be provided here, only the most crucial points can be briefly discussed. When defining'engineering' in English dictionaries, two important yet distinct meanings are particularly emphasized. One refers to engineering as*study*, whose reference and meaning primarily pertain to the learning (study) in engineering colleges and of engineers. The second refers to engineering as*activity*, meaning engineering practice. It must be admitted that in the context of engineering colleges, when people hear 'engineering',many often first think of engineering study, and this meaning of engineering should be translated into Chinese as '工程学'(gongchengxue)– engineering science. Based on the limited English literature I have seen, in the initial literature researching the philosophy of engineering, many approached it from the perspective of engineering education. This means that although in English, 'engineering' can refer to both engineering study (science) and engineering activity (practice), some scholars, intentionally or not, primarily understand it as the former. It is particularly important to note that this semantic habit inevitably influences the process, manner, and results of researching the philosophy of engineering in English, in terms of the object, content, and mode of thinking. However, in Chinese, when people talk about 'gongcheng'– for example, referring to the Baosteel Project, the Three Gorges Project, or the Qinghai-Tibet Railway Project – these Chinese terms are translated as 'project,' not 'engineering'. This is to say, in Chinese vocabulary and Chinese thinking, 'gongcheng' often primarily refers to engineering*practice*, not to engineering*study*(science).

These differences have alreadyinfluenced the fundamental lines of thought of Western and Chinese scholars pioneering the field of the philosophy of engineering. When Chinese scholars think about issues in the philosophy of engineering, the scenario that first appears is like "the process and construction site of the Qinghai-Tibet Line construction" and the philosophical problems arising therefrom. Whereas, when Western scholars think about issues in the philosophy ofengineering, the scenario that first appears might be "teachers and students in engineering colleges discussing engineering science problems in the classroom" and the philosophical problems arising therefrom. The distinction mentioned above, while not absolute, is non-negligible. I believe that this difference in Chinese semantics and context allows Chinese philosophers and engineers to more easily and conveniently embark on the path of pioneering the philosophy of engineering. In contrast, the semantic habit concerning the notion of 'engineering' in English often confines scholars within the barriers of the philosophy of science. For example, the second monograph on the philosophy of engineering in English, "Philosophy in Engineering" (2007) [10], characterizes its research as being incorporated into the confines of the philosophy of science, effectively viewing the philosophy of engineering as a subordinate branch, failing to assert confidently that they are parallel branches and their relationship is that of "siblings," not "parent and child". The Chinese native language makes it easier for Chinese people to understand engineering from the approach and scenario of engineering activities and practice.

Both science and the philosophy of science emphasize necessity. However, in a deterministic world of strict necessity, engineering practice (changing the world) would become impossible. Engineering activities cannot rely solely on the philosophy of science; they raise many profound philosophical problems, including contingency, free will, and others. This again confirms that native Chinese speakers tend to first associate 'gongcheng' with 'project', with engineering practice, and this situation profoundly influences the content of thought and theoretical direction.

It must be stated that the above analysis and explanation are very simplified. Actually, how to discern the complex semantics and interrelationships of English words like engineering, technology, technique, technics, techne, science, art, fine art, work, workmanship from the perspectives of the philosophy of language, linguistics, linguistic analysis, the philosophy of engineering, the philosophy of science, and the philosophy of technology, as well as how to analyze the complex semantics and interrelationships of Chinese terms like '工程'(gongcheng),'技术'(jishu),'技艺' (jiyi),'工艺' (gongyi),'农艺'(nongyi),'手艺'(shouyi),'文艺' (wenyi),'事理'(shili),'器理'(qili),'道' (dao), '器'(qi), is by no means easy; it is a subject requiring further in-depth research. As for analyzing and researching the semantics, philosophical interpretations, and interrelationships of numerous terms in comparisons between Chinese and English, German, French, Russian, and other languages, that is an even more arduous and important task.

Here, let me briefly mention a famous work in the analytic philosophy tradition - J.L. Austin's "How to Do Things with Words". This book has been appreciated by many scholars studying the philosophy of language as a profound and insightful work. However, if we look at the issue here from the perspective of the philosophy of engineering, it is obvious that constructing the Three Gorges Project or the Qinghai-Tibet Railway are acts of doing things, but these engineering projects cannot be built by "using words". Neither Chinese people nor Europeans or Americans would talk about how to"use words" to carry out engineering. When considering doing things, one needs to ask how to conduct engineering activities through design, decision-making, equipment, operating procedures, technological processes, enterprise systems, etc.One absolutely cannot do it without using language, but if only language is used, it is impossible to realize engineering activities. It can be expected that in the future, if we further combine the basic viewpoints, lines of thought, and methods of both the philosophy of engineering and the philosophy of language, it would be of great significance for the development of both. I have already made some preliminary attempts in this new direction and hope to conduct more research in the future.

We can compare theEnglish 'art' and the Chinese '艺' (yì). In the modern Chinese context, university majors are divided into two categories: one is Humanities and History, the other is Science and Engineering. Arts are classified under Humanities. However, when I read some English literature, many define engineering as an*art*, which once surprised and puzzled me. Does engineering belong to science or to art? Later, I considered that in Chinese, we often say'手艺' (handicraft),'工艺' (craft/technology),'农艺' (agronomy), and'技艺' (skill), which acknowledges that technology and craftsmanship (ancient handicrafts and modern industry) should be categorized under the realm of 'art'.Linguistic analysis and the philosophy of language involve not only many factual issues, object issues, philosophical issues, semantic issues, etc., in reality, but also the evolution of word meanings from ancient to modern times and the complex problems associated with it.

Although modern engineering education and practice often emphasize the scientific foundation and engineering technology aspects, no one neglects the importance of artistic factors in modern engineering activities –especially in architecture and civil engineering. Engineering activities should pursue the unity of truth, goodness, and beauty. Previous aesthetics mainly focused on the aesthetic issues in artists creating beauty and artworks (paintings, sculptures, poetry, etc.). In the future, we should re-recognize and research engineering aesthetics, pay attention to the fact that engineers also create beautiful engineering works, must study the aesthetic issues in engineering products (bridges, airplanes, dams, etc.), and establish engineering aesthetics as a new branch and new field of aesthetics.

Q10: What do you believe is the most significant transformation in China's technological culture during your lifetime?

Li: From my birth until now, this has been the period of most drastic change in China's long history. China's industrial modernization process began during the Westernization Movement starting in 1861. Although technology also changed during the medieval period, the pace of change was very slow. After the Westernization Movement, although some qualitative changes occurred in production and technology, due to China's vast area and large population, the production and technological landscape in many small cities and rural areas still did not undergo fundamental changes. During my childhood and adolescence, many farmers in rural China still used agricultural tools that had remained largely unchanged for millennia. In the early 1950s, although Zhengzhou city had electric lights, many households still used kerosene lamps. After China's First Five-Year Plan, following the introduction of the 156 projects from the Soviet Union, China's technology and engineering systems were upgraded to a new stage, and the lives of urban residents also saw considerable changes; bicycles became common means of transport in cities. In 1954, when buses appeared for the first time in Zhengzhou, the capital of Henan province, the public regarded them as novelties. In the 1960s, Beijing got a subway system, and many people from other parts of the country considered riding the Beijing subway a novelty.But the truly monumental change in China's technological culture occurred after the "Reform and Opening-up". The Chinese people have a personal feeling for the monumental changes in this period, and many foreigners coming to China have witnessed this transformation. Within just a few decades, China became the world's second-largest economy, and its output of many industrial products ranks first in the world. In the field of technological culture, and in the production and consumption of new technological products, the notion of"changing with each passing day" perfectly describes the situation in China. Over these decades, China transformed from an agricultural country into a moderately developed industrialized nation. I believe the most important change in China's technological culture is the fundamental transformation in the country's overall technological level (including the level of technical equipment), overall technological capability, and the level of the technological workforce (including R&D capability). The technological gap (especially the capability gap) between China and the world's most developed countries is gradually narrowing. For the public, this manifests as changes in lifestyle. Of course, this understanding absolutely does not deny that China still faces many deep-seated problems in its own technological development.

In the past, both in Europe/America and China, many people did not distinguish between technology and engineering. However, the core of technology is invention; invention is a pioneering, one-time activity, and invention does not involve issues of scale. Engineering activities involve the scaled production and manufacturing of invented items (like steam engines, electric motors, or computers) and their large-scale application, enabling hundreds of thousands of people to use them. The characteristic of engineering activities often manifests as a repeatable production process. In engineering activities, the issue of scale becomes an important content and feature. There are also other characteristics that distinguish technology from engineering.

In the past, many people primarily understood engineering from the perspective of technical elements; today, people's understanding of the role of non-technical elements in engineering is becoming increasingly profound. The composition of these elements may differ greatly under different conditions and in different countries. For example, the rapid development of high-speed rail in China has amazed the world, yet developing high-speed rail in the United States faces numerous difficulties. The reason for this difference lies not in the technical elements, but in the different social and economic environments of China and the United States.The social environments, cultures, and technological traditions of different countries often differ significantly. For instance, the technological cultures of Japan and Germany are quite distinctive in the world. China's engineering culture has both similarities and differences with other countries, which is more related to social factors. However, this issue is too complex to discuss further here.

Q11: What do you consider the most challenging socio-technical problem of our time? Do you believe the age of anthropocentrism will end in the foreseeable future?

Li: Regarding anthropocentrism, different scholars have different definitions and viewpoints. I have no intention of intervening in the debate about'anthropocentrism,' but based on my understanding, I believe philosophy is the 'study of humanity'; in this sense, I stand on the position of 'anthropocentrism'. From the macroscopic perspective of cosmology, initially there was the inanimate material world; this is the first stage. Later, life originated, and the biological and living world emerged based on the material world; this is the second stage. Furthermore, humanity originated, and the human world emerged based on the material world and the biological realm; this is the third stage. The fundamental difference between the biological world and the physical material world lies in the fact that living beings have knowledge and intelligence, while the difference between the human world and the biological world lies in the fact that humans not only have knowledge and intelligence but also have wisdom, and can engage in creative activities.

Although philosophy is defined as the love of wisdom, many philosophers have often focused mainly on the philosophical problems of knowledge rather than of wisdom. Currently, unprecedented new situations and circumstances have emerged in human history; many problems concerning artificial intelligence have sparked new reflections and debates. I am also gradually learning and reflecting. I believe that we must think about the many problems encountered today, especially those in the field of artificial intelligence, from the height and perspective of human wisdom. If we neglect and forget that humans possess not only knowledge and intelligence but also wisdom, we will inevitably fall into confusion and go astray in understanding many issues related to artificial intelligence. Regarding the many issues in this area, I currently only have preliminary understandings and thoughts.

Q12: Given the fundamental importance of engineering to modern society, in your view, should the philosophy of engineering be, and is it, social philosophy, or perhaps even political philosophy?

Li: As mentioned before, engineering includes technical elements and non-technical elements. The more cutting-edge the engineering activity and the larger its scale, the more important the role of political, social, and economic elements becomes, often even playing a decisive role. Situations where economic elements – primarily funding –determine the success or failure of an engineering project are commonly seen. Not only large-scale projects, but even small and medium-sized projects can be affected by the political environment and political considerations, even when both technical and economic conditions are met. Political elements not only determine whether an engineering project can be implemented but often also determine its scale and construction timeline. This is the case in all countries and is one of the important distinctions between engineering and other scientific and technological activities - such as research work in laboratories. Of course, the specific degree of influence needs to be analyzed concretely in combination with the specific project and its circumstances. In the "Introduction to the Philosophy of Engineering," I briefly discussed the relationship between the philosophy of engineering and social philosophy. It can be said with certainty that in the future development of the philosophy of engineering, research on the interrelationships between the philosophy of engineering, social philosophy, and political philosophy is bound to become a new focus.

Q13: What are the unique aspects of the ontological issues of engineering and engineering science compared to the ontological commitments of natural science?

Li: First, ontology, metaphysics, and realism are closely related but also have certain distinctions, but below I will mainly focus on their close connections. Second, the problem of ontology is closely related to the problem of language, more specifically, 'being'is closely related to the copula in linguistics. Many philosophers, ancient and modern, who study ontology agree that ontology is the study of 'being as being," and ontology must fundamentally answer questions about'what is'.

What is the answer of engineering ontology to 'what is engineering'? According to the view of Chinese scholars, engineering ontology holds that engineering is real, direct productive force. Productive force is originally an economic concept. The content and meaning of productive force refer to activities that change the original state of nature and create new artifacts through production activities. This makes the understanding of engineering ontology fundamentally different from traditional ontology. The engineering ontology is not a "copula-based" line of thought, but rather a line of thought of'philosophy of creation' and 'method of creation'.

In languages like Greek and English, the copula is very important; the subject-copula-predicate structure becomes a fundamental sentence pattern. In this pattern, the subject is a noun, the predicate is a noun or adjective, and the copula "links" the subject and predicate. This language and thinking tend to regard nouns as the core objects and themes of thought. However, in classical Chinese, the copula is often not used, directly connecting the subject and predicate. This creates many differences in the language systems and thinking modes between Chinese people and Europeans, consequently also leading to many differences between the philosophical systems. Philosophers like Zhang Dainianand Li Zehoupointed out that when Chinese philosophers use the term '本体论' (ontology) in Chinese, its actual meaning and interpretation have some fundamental differences from the 'ontology' of Western philosophers.

In any language system, besides the subject-copula-predicate sentence pattern, there is another, more important sentence pattern: the subject-verb-object pattern. In this pattern, the verb has core importance, and the relationship between subject and object is also different from that between subject and predicate. Ontology focuses more on studying philosophical problems closely related to nouns and adjectives and the question of 'What is reality?', while the philosophy of engineering focuses more on studying philosophical problems closely related to verbs and adverbs and the issues of creation, operation, and effect. In this sense, although one can still talk about the 'ontological' problems of the philosophy of engineering using traditional terminology, this viewpoint, which highlights the creativity of productive force, the engineering creative process, and the philosophical significance of verbs,is fundamentally different.

Looking back at the history of philosophy, Plato proposed in the"Timaeus" the theory of the Demiurge - as the creator. Christianity claims that God created the world in seven days in a one-time act. Some historians of philosophy have not paid particular attention to the significance of the above views for the history of philosophy and their influence on modern philosophical theoretical systems. The philosophy of engineering re-articulates the problems of the creator and the philosophy of creation. It holds that humanity is the creator; the creators of modern engineering are the modern engineering community (including engineers, workers, investors, managers, other stakeholders). The creative activities of humanity and the engineering community are not "one-time" but are continuously and countlessly repeated creative activities. Unlike God creating the world from nothing in a single act, the engineering community must use engineering tools and equipment on the substrate of material substances, according to engineering design plans and operating procedures, to create target artifacts that unify structure and function, causality and purposiveness, and natural laws and engineering rules.

My book "An Outline of the Theory of the Artificial"has a subtitle: "A Philosophy of Creation". The final chapter of the Chinese version of "Introduction to the Philosophy of Engineering" no longer understands the philosophy of engineering as a branch of philosophy but explicitly advocates that the philosophy of engineering is 'philosophy itself', a new form of philosophy. The concluding remarks emphasize: "Humans must not only think (thinking before, during, and after action), but more importantly, they must'settle' their bodily existence and 'establish' their life destiny. Humans 'settle' their 'bodies' and 'establish' their 'destinies' (note: here there are two verbs and two nouns) between heaven and earth, achieving the unity of heaven, earth, and humanity.The philosophy of engineering is here, and the whole of philosophy is also here."The "Introduction to the Philosophy of Engineering" uses"I Create, Therefore I Am" as its subtitle, emphasizing this is the "philosophical motto" of the philosophy of engineering, set against Descartes' famous philosophical motto "I Think, Therefore I Am".Establishing the 'philosophy of creation' as a"basic theory of philosophy" standing alongside ontology, epistemology, methodology, and axiology is a very ambitious goal; to reach it, there is still much work to be done.

It is worth noting that European and American scholars have also seen this direction and gradually clarified this "macro aim" and purpose regarding the philosophy of engineering. The introduction to"The Routledge Handbook of the Philosophy of Engineering" [11, p. 7] concludes with the following words: "as recently as twenty years ago this Handbook would have been unimaginable, and now it no longer is. The dimensions of creativity, complexity, and open-endedness give rise to the idea that no matter at what point in the future, philosophy of engineering will always be in a dynamic and beta-state, marked by imagining and reimagining, and making important contributions not only to the understanding of engineering, but also to philosophy itself".In this view, Chinese and Western philosophers "echo each other from afar".

If the philosophy of engineering is studied as philosophy itself in the broad sense (whether it is still called ‘philosophy of engineering’ can be further considered), then it must study not only problems of technological and engineering creation but also problems in the fields of thought creation, artistic creation, institutional creation, and social creation, and integrate them. This prospect is very enticing, and the task is very arduous. I am working hard in this direction and hope to achieve some new results in the future.

Science primarily pursues “truth”, ethics primarily pursues “goodness,” while a characteristic of engineering is that it simultaneously involves truth, goodness, and beauty. The “theory of truth” and“realism” in the philosophy of engineering and engineering activities are fundamentally different types of “theory of truth"” and “realism” from those in the philosophy of science and scientific research activities. If the nature of the philosophy of engineering can be positioned as the ‘Fourth Critique’, according to Dessauer, standing alongside Kant’s three Critiques, then the significance of the philosophy of engineering is not that of a branch of philosophy parallel to the philosophy of science, but rather philosophy itself.

Q14: What is your view on the position of engineering science in engineering practice?

Li: In this regard, China’s Professor Wang Dazhouhas undertaken a major project of the Ministry of Education, “Research on Basic Theoretical Issues in the Philosophy of Engineering Science”, which is expected to achieve important pioneering theoretical results. In the past, there have been relatively few people in engineering and academic circles who explicitly and directly researched ‘engineering science’ and the philosophy of engineering science. However, the past research results can serve as a foundation for our further research; for example, the ‘Pasteur’s Quadrant’ is an inspiring and important concept.Pasteur’s research work included two types: one part was basic scientific theory, such as fundamental concepts and theories in immunology, while the other part was more engineering-oriented, such as vaccine manufacturing. The division of Pasteur’s Quadrant involves basic science and engineering science, but this division itself can be further deepened and specified.

Engineering science primarily studies the laws of artifacts, such as aircraft lift, how to improve engine efficiency, and other problems. Therefore, successful engineering relies mainly on engineering science. Relying solely on general aerodynamic theory cannot directly design efficient aircraft engines; one also needs the theories and technologies of engineering science. Engineering science must ultimately connect with engineering practice, and connecting with engineering practice must be embodied in engineering rules and engineering standards. Traditional philosophy primarily focuses on natural-scientific laws, while engineering science and the philosophy of engineering, including the philosophy of economics, must focus on and study the laws of constructing artifacts, and must study the principles of rule-making and the theoretical problems of rule-following.

Q15: Would you be willing to share some thoughts on poetic living as an ideal way of life and its relationship to the philosophical way of life?

Li: The purpose and task of engineering activities are to meet people’s practical life needs and make life happier. Thus, the philosophy of engineering is closely linked to poetic living. Some philosophers understand the ideal way of life as a life of pure theory, yet anyone’s life is necessarily a life based on economic and social reality. The ideal way of life must be grounded in this foundation and cannot detach from it. Chinese Chan (Zen) Buddhism says, that“carrying water and chopping wood are themselves the marvelous Way,” which contains profound philosophical thought and life wisdom. In engineering, truth, goodness, and beauty are unified. Of course, this does not prevent us from independently studying the truth, goodness, and beauty in engineering separately.

Traditionally, whether in Europe or China, the primary object of study in aesthetics has been artworks. Therefore, how to understand all artifacts, including engineering products, from the perspective of beauty is an important question. Aesthetics originally meant the study of sensibility, and all sensible artifacts are products of engineering – hence, we need to research engineering aesthetics. For example, Heidegger discussed the muddy shoes of a peasant woman in a Van Gogh painting, considering the painting beautiful. But are the real, actual muddy shoes beautiful? The aesthetic value of an object itself and its artistic representation may not coincide. The same issue exists for all artifacts. How to understand and analyze the aesthetic and beauty issues in everyday items, tools, and even large industrial equipment are all questions that engineering aesthetics should address.Although Heidegger and others mentioned issues like "poetic dwelling", they did not truly consider the beauty in labor and engineering activities as a theme.

The beauty of artifacts includes the beauty of their own form and the beauty of added decoration. For instance, a Chinese Academy of Engineering academician once raised a question about the beauty of bridges that surprised both aestheticians and ordinary people: How much is the beauty in a bridge worth? More specifically, how much money can be spent on beauty in bridge construction?Some bridges have inherently beautiful geometric structures, like arch bridges. But many bridges often have added sculptures and decorations after completion, like the Charles Bridge in Prague. What proportion of the total bridge budget can be allocated to aesthetic elements like sculptures and decorations? This academician believed that generally, a proportion between 5% and 30% is acceptable. As for the specific spending ratio, it depends on the specific positioning of the bridge. For example, a bridge in remote mountains needs little decoration. If it's a bridge serving as an urban landmark, the proportion of economic investment in sculptures and decoration could be higher, and in extremely special cases, it might even reach 50%.

Since in the aesthetic tradition, the focus has often been mainly on artistic beauty, neglecting engineering beauty, this makes pioneering and developing engineering aesthetics a new subject and new task in the fields of both aesthetics and the philosophy of engineering.Although many countries have produced many important research results in the field of architectural aesthetics, for the entire field of engineering, attention to engineering beauty can still be said to be a weak point, and in many specific engineering industries, could even be called a blind spot.

The interaction between the artifacts and people together constitutes a kind of "realm" or "state". In traditional Chinese aesthetics and the Chinese language, beauty is considered a realm of life.Nature itself has no issues of quality, safety, error, or realm. But engineering activities and their products have issues of quality, safety, and the realm of beauty, which can also be spoken of as the"poetic" realm, because "poetry" here no longer refers to a literary form but to a spiritual experience and an ideal way of life. Many Chinese and foreign poets and philosophers have expressed this understanding and idea. Craftspeople, farmers, engineers, and entrepreneurs can feel a kind of intellectual and spiritual experience in their engineering creative activities regarding the engineering work they are engaged in. In Chinese, this can be called a "poetic" experience.

As mentioned earlier, engineering is labor. For various reasons, many people primarily experience labor as arduous. However, under other conditions, because labor and engineering are creative work, a concentrated expression of human creativity, there can also be new understandings and experiences in labor and engineering. Chinese Chan Buddhism highlights that agricultural labor can contain Chan meaning, which is also poetic meaning. Similar ideas exist in Christianity. Hegel's viewpoint on the master-servant relationship in the"Phenomenology of Spirit" [12] can inspire us in multiple ways. When philosophers discuss poetic living, they should combine the mud-stained reality with the ideal light that illuminates reality. This is a very important and difficult task.

Q16: Could you say a few more words about the proposal of"verb-centered philosophy", in contrast to "noun-centered philosophy"?

Li: My major in university was language and literature, and I paid attention to some linguistic issues even then. In the 1990s, against the background of the philosophy of language, I read some works on linguistic theory and the history of linguistics. I noticed that in linguistics, some emphasize the importance of nouns more, while others emphasize the importance of verbs more, which left a deep impression on me. The penultimate sentence of "Introduction to the Philosophy of Engineering" particularly emphasizes the meaning and importance of "settling one's bodily existence and establishing one's life destiny" (安身立命), and specially points out that in this phrase, there are two verbs and two nouns. In 2022, I published an article titled "People and Affairs, and the Logic of People and the Logic of Affairs - Also on the Linguistic-Philosophical Study of Sentence Patterns" [13] in the journal *Philosophical Analysis*, briefly discussing the importance of verbs, pointing out that the subject-copula-predicate pattern and the subject-verb-object pattern are two different sentence patterns, and emphasizing their philosophical significance.

Many people believe that the major progress in 20th-century Western philosophy is manifested in the philosophy of language. Many 20th-century philosophers of language often emphasized that the philosophy of language is not a branch of philosophy but is philosophy itself. I disagree with this understanding and believe that philosophy of engineering in a broad sense is a first philosophy. In social life, it is linguistic activities that are subordinate to engineering activities.

Here, I also want to point out a strange phenomenon: in the philosophy of science, few people look down on science and scientists; most believe that the achievements of science are the foundation of their philosophical research. However, in the field of the philosophy of language many philosophers of language completely look down on linguistics and linguists, and do not believe that the philosophy of language should be built upon the foundation of linguistic theory. Deep in the hearts of many philosophers of language, they probably think that since they can all speak, researching the philosophy of language fundamentally does not require referencing the viewpoints of the science of linguistics, let alone needing to base their linguistic research on linguistic theory. It must be admitted that the relationship between the philosophy of language and linguistics is very complex, especially because the field of linguistic theory is also full of diverse opinions, and also has its immature aspects; specific theoretical viewpoints in linguistics are constantly being adjusted and developed.

Q17: What are your expectations for the future of Sino-Western exchange in the philosophy of engineering?

Li: In the last ten to twenty years, the number of people interested in the philosophy of engineering has been increasing in China and in the West. Compared to fields like the philosophy of science, philosophy of economics, and science communication, international exchange in the philosophy of engineering is clearly insufficient, but its momentum is good. It is hoped that China, the United States, Europe, and others can work together to advance development in this field. Currently, SPT and fPET hold academic conferences in odd and even-numbered years respectively; they are both platforms for exchange in the philosophy of technology and the philosophy of engineering and will undoubtedly play a greater role in the future. China has also hosted the 19th SPT conference in 2015 (Shenyang, China) and fPET in 2012 (Beijing, China). The University of Chinese Academy of Sciences will host SPT 2027, and we hope it will be successful.

Q18: In your view, does studying and researching the philosophy of engineering have guiding significance for an individual's life?

Li: I believe the significance lies in enhancing engineers' consciousness of engineering and raising their philosophical awareness of engineering. Consciousness, spontaneity, and being compelled are fundamentally different; engineers should enhance their own awareness of the philosophy of engineering.

In a narrow sense, an engineer is someone engaged in engineering activities who possesses professional knowledge, professional ability, and professional ethical spirit; the conditions are very strict, and ordinary people are not engineers. However, people have called teachers "engineers of the human soul," and doctors can be seen as engineers –or at least as a profession of the same kind as engineers. In current Chinese society, many social activities with relatively clear goals are often called 'projects', such as Project 211 and Re-employment Project. An important type of engineer is the designer, yet several famous scholars have argued that everyone is a designer.

Why can one consider that everyone is a designer and engineer? Because, broadly speaking, engineering activities are about *doing*things. Previous philosophers mainly focused on 'things' (物) and did not particularly focus on 'affairs' or 'events' (事). But now, more philosophers are beginning to pay attention to 'affairs/ events,' viewing the notion of 'event' as a fundamental philosophical category. Obviously, the process of life is a continuous process of "doing things": civil engineers building bridges are doing things, scientists conducting research are doing things, teachers giving lessons are doing things, parents raising children are doing things, entrepreneurs are doing things, officials are doing things, and so on.

Viewing engineering broadly, all human activities are engineering. Although Popper opposed the concept of large-scale social engineering, he could not deny the existence of piecemeal social engineering. Now, if we can clarify that life is a process of continuously doing things, and if we clarify that the general analysis and general understanding of the philosophy of engineering can also apply –it must be noted: not applied mechanically –to various different jobs and activities, and clarify that the meaning of engineering activities lies in moving towards an ideal realm of life, then the question of what significance the philosophy of engineering has for an individual's life is readily solved.

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