

70 Years of Logic in China, 1949–2019

CHEN Bo*

Abstract

This article outlines the history of logic in China from 1949 to 2019. Firstly, it presents a rough picture of Chinese logic before 1949 using broad brushstrokes. Secondly, it divides the whole process of development into two stages. In the first 30 years from 1949 to 1979, Chinese logic made some achievements, but also went along some detours, and its overall situation was unsatisfactory. In the latter 40 years from 1979 to 2019, due to Deng Xiaoping's reform and opening up, many Chinese logicians went abroad for academic visits or to study degrees in foreign universities or research institutes, gradually became familiar with and even integrated into the international mainstream of logic teaching and research, and ushered in the great flourishing of logic in China we see today. Finally, it draws four lessons from this process of development, as follows. 1) Let politics and academia live in peace, by respecting and adhering to the idea of academic freedom. 2) Academic advances cannot be achieved in isolation from the world, so we should fully embrace the international academic community, while insisting on our own independent thinking. 3) We should always adhere to the policy of "letting a hundred flowers blossom and a hundred schools of thought contend", so that different academic viewpoints and tendencies can be improved and developed in their mutual collision. 4) We should cultivate academic self-confidence, gradually make the change from pure follow-up learning to original work in some fields of logic.

Keywords: Chinese logic, logic teaching, popularization of logic, research on logic, reform and opening up, letting a hundred flowers blossom and a hundred schools of thought contend

Sedemdeset let logike na Kitajskem, od 1949 do 2019

Izvilleček

Članek orisuje zgodovino logike na Kitajskem med letoma 1949 in 2019. Na začetku poda grobo sliko razvoja kitajske logike pred letom 1949. Nadalje razdeli celoten razvojni proces na dve stopnji. Čeprav je v prvih tridesetih letih, od 1949 do 1979, kitajska logika ustvarila nekaj dosežkov, je hkrati na svoji poti tudi zašla, tako da je bilo njeno splošno stanje na koncu nezadovoljivo. V naslednjih štirih desetletjih, med letoma 1979 in 2019, je zaradi Deng Xiaopingovih reform in odpiranja Kitajske svetu veliko kitajskih logikov

* CHEN Bo, School of Philosophy, Wuhan University.
Email address: chen-bo@whu.edu.cn



dobilo priložnost študirati na tujih univerzah in raziskovalnih inštitutih. Tako so se postopno seznanili z osrednjimi mednarodnimi trendi v poučevanju in preučevanju logike, ali pa so se vanje tudi sami vključili, s čimer so utrli pot velikemu uspehu logike na Kitajskem. Na koncu članek poda še naslednje štiri lekcije, ki izhajajo iz preteklega razvojnega procesa: 1) Politika in akademija naj sobivata v miru, medtem ko naj prva dosledno spoštuje idejo akademske svobode in ji tudi sledi. 2) Znanstvenega napredka ni mogoče doseči v izolaciji od sveta. Zaradi tega se moramo v polnosti odpreti mednarodni akademski skupnosti, medtem ko hkrati vztrajno gojimo tudi samostojno misel. 3) Vedno moramo slediti politiki »naj cveti sto cvetov in sto šol naj tekmuje med seboj«, da se lahko v medsebojnih trkih izpopolnijo ter razvijejo različna akademska stališča in težnje. 4) Gojiti moramo akademsko samozavest in postopoma doseči prevoj iz učenja ob sledenju drugim do položaja vodilnega v posameznih vejah logike.

Ključne besede: kitajska logika, poučevanje logike, popularizacija logike, raziskovanje logike, reforme in odpiranje svetlu, kampanja stotih rož

Chinese Studies in Logic before 1949

Aside from ancient Greek and Indian logic, Chinese logic from the pre-Qin period represents one of the three major sources of logic in the world. The latter, however, has not got a continuous developmental history, and almost passed into obscurity after the Han dynasty. Notwithstanding the fact that, in the time of late Ming dynasty, Li Zhizao 李之藻 (1571–1630) and others had already produced a translation of Aristotle's *De logica* (*Mingli tan* 名理探), and that Matteo Ricci (Chinese name Li Madou 利玛窦, 1552–1610) and Xu Guangqi 徐光启 (Seu Kwang-ke, 1562–1633) composed a translation of Euclid's *Elements*, these early translations did not have any great influence. In the late Qing dynasty, Yan Fu 严复 (1854–1921) and other Chinese scholars, who embarked upon the mission of saving the nation and ensuring its survival (*jiuwang tucun* 救亡图存), produced Chinese translations of such notable works as Mill's *System of Logic* (*Mule mingxue* 穆勒名学), W. S. Jevons' *Logic Primer* (*Mingxue qianshuo* 名学浅说) and *Logic* (*Bianxue* 辩学), as well as a translation of *Logic* (*Ronrigaku* 论理学) by the Japanese philosopher Ōnishi Hajime 大西祝, but these early translations were still not very influential. In the Republic of China (ROC) period, among the many young people who chose to pursue their studies at foreign universities there were some who were able to study or even conduct specialized research in logic. Following their return to the homeland, these young scholars continued their interest in logic by translating and publishing Western as well as Japanese works on the subject. According to incomplete statistics, in the period between the 1920s and 1940s

almost 30 different works in Western traditional logic were introduced to China by means of translation, including popular textbooks used at foreign universities, such as, for example, the textbook *An Introductory Logic* composed by the professor and head of the research institute at Cornell University in the United States. (Ju 2013, 2)

At the same time, these foreign-educated scholars also started composing their own textbooks for their courses on logic given at Chinese senior secondary schools, normal schools, and universities. Among these textbooks the most important were the following: Jiang Weiqiao's 蒋维乔 *Lectures in Logic* (*Lunlixue jiangyi* 论理学讲义) from 1912; Zhang Zihe's 张子和 *New Logic* (*Xin lunlixue* 新论理学) from 1915; Tu Xiaoshi's 屠孝实 *Outline of Logic* (*Mingxue gangyao* 名学纲要) from 1925; Zhu Zhao'ai's 朱兆萃 *The ABC of Logic* (*Lunlixue ABC* 论理学ABC) from 1928; Wang Zhanghuan's 王章焕 *A Summary of Logic* (*Lunlixue daquan* 论理学大全) from 1930; Shen Youqian's 沈有乾 *Logic* (*Lunlixue* 论理学) from 1936, and his *Logic for Senior Secondary Schools* (*Gaozhong lunlixue* 高中论理学) from 1938,¹ Jin Yuelin's 金岳霖 *Logic* (*Luoji* 逻辑) from 1937 (script 1935), and Zhang Shizhao's 章士钊 *Essentials of Logic* (*Luoji zhiyao* 逻辑指要)² from 1943.

In 1920, in the framework of his one-year visit to China, Bertrand Russell delivered a series of lectures on mathematical logic at Peking University. Although originally four lectures were planned, the series was soon interrupted due to Russell falling ill. Later, in 1921, the notes from his lectures were collected and published in the form of a monograph by the New Knowledge Publishing House of Peking University. One year later, a Chinese translation of Russell's book *Introduction to Mathematical Philosophy* was also published. In that way, mathematical logic started to become known to Chinese scholars. A few years later, in 1927, Wang Dianji's 汪奠基 *Treatise on Logic and Mathematical Logic* (*Luoji yu shuxue luoji lun* 逻辑与数学逻辑论) was published, in which the author discussed the elementary principles of traditional formal logic and mathematical logic. In fact, Wang's book was an unabridged Chinese translation of his thesis from the University of Paris, but also the first textbook of mathematical logic written by a Chinese scholar. Other works containing an account of mathematical logic included Shen Youqian's *Modern Logic* (*Xiandai luoji* 现代逻辑) from 1933; Wang Dianji's *Modern Logic* (*Xiandai luoji* 现代逻辑) from 1937; Jin Yuelin's *Logic*, and Mou Zongsan's 牟宗三 *Logical Paradigms* (*Luoji dianfan* 逻辑典范) from 1940. Among these, only Jin Yuelin's *Logic* has any great success, having been used widely and thus garnered greatest influence. Originally,

1 The latter is a reprint of the 1933 edition.

2 This work was originally composed for his lectures at Beida in 1917, which is quite apparent when one looks at its language and content.

the book was the script used for Jin's lectures on logic given at Tsinghua University. It is divided in four main parts: the first part speaks about the theory of inference in traditional logic; in the second part, Jin advances a critical account of the existential problems of traditional logic, discussing in particular the existential import of subjects in categorical propositions; the third part introduces the logical system of Whitehead's and Russell's monumental work *Principia Mathematica* (1910–1913), including propositional calculus, predicate calculus, calculus of classes, and relational calculus; the fourth and last part discusses meta-logic of logical systems and conceptions of logic, involving concepts like the completeness, consistency, and independence of logical axioms, and numerous other elementary logical concepts such as “necessity”, “contradiction”, “implication”, the characteristics and status of the so-called “three laws of reasoning” (i.e. the law of identity, the law of contradiction, and the law of excluded middle), and so on. It was through Jin Yuelin's *Logic* and his teaching that China's earliest generation of talented scholars in modern logic was fostered, in which there was no lack of internationally respected experts like Hao Wang 王浩 and also a great number of outstanding specialists such as Shen Youding 沈有鼎, Wang Xianjun 王宪均, Hu Shihua 胡世华, Zhou Liqun 周礼全, and Yin Haiguang 殷海光, among others. Hence, one can rightly claim that Jin Yuelin was the founder of modern logic in China.

In the field of the history of ancient Chinese logic, the most influential treatise was Hu Shih's 胡适 doctoral dissertation from Columbia University entitled *The Development of the Logical Method in Ancient China* (English, 1922; Chinese translation, 1983). Hu's treatise was

not only China's first periodized historical monograph on ancient Chinese logic, but also the first book introducing ancient Chinese logical thought in English language. Its rich, and rather original, content was of considerable reference value and enlightening impact on the later more advanced research in ancient Chinese logic. (Zhou 2004, 423)

Apart from Hu's treatise there was also Zhang Shizhao's *Essentials of Logic*, which was both a textbook in logic as well as a study in Chinese ancient logic, in which the author strived to realize his noble aspiration to “advance a unique perspective by blending together the Chinese and the Western” (ibid.).

The Influence of Soviet Textbooks

In the ten and more years after 1949, due to then existing political circumstances the People's Republic of China (PRC) regarded the Soviet Union as its “big

brother”, and consequently engaged in comprehensive learning from the Soviets, and the field of logic was no exception. There, one of the most important objectives was the publication of Chinese translations of numerous Soviet logic textbooks, some of which even obtained several different translations. These textbooks included the following: *Logic (Luoji xue 逻辑学)* by S. N. Vinogradov and A. H. Kuzmin (1950), a secondary school textbook approved by the Soviet ministry of education; *Logic (Luoji 逻辑)* by M. S. Strogovich (1950); *A Course Syllabus in Logic (Luoji jiaoxue dagang 逻辑教学大纲)* edited by V. T. Makarov (1956); *Logic (Luoji xue 逻辑学)* by D. P. Gorsky (1957); and *Logic (Luoji 逻辑)* edited by Gorsky and Tavanec (1957). Among these, the Chinese translations of the textbooks *Logic* by Strogovich and *Logic* by Gorsky and P. V. Tavanec had the highest circulation and were used most widely.

By and large, the general appearance of Soviet textbooks on logic can be known from the layout of chapters in the last two textbooks. Strogovich’s *Logic*, for instance, is composed out of 12 chapters, whose titles were as follows: “The Object of Logic”; “The Fundamental Laws of Logical Thinking”; “Formal Logic and Dialectical Logic”; “Concepts, with a Special Focus on their Nature, Intensions and Extensions, Kinds and so on”; “Definition of Concepts”; “Differences between Concepts and their Classification”; “Judgments, with a Special Focus on Structures of Categorical Judgments and their Types”; “Judgments (Continued), with the Special Focus on Truth-relations between Categorical Judgments, Negation of Categorical Judgments, etc.”; “Inference, Direct Inference”; “Syllogisms”; “Inductive Methods”; and “Proof”. Based exclusively on Aristotelian logic, the content of this textbook did not even touch upon topics such as compound judgments and their inferences. The book *Logic* by Gorsky and others, on the other hand, was comprised of 16 chapters altogether: “The Object and Meaning of Logic”; “Concepts, with a Special Emphasis on their Characteristics, Intensions and Extensions, Kinds and so on”; “Logical Inference and Deduction of Concepts, with an Emphasis on Restriction and Generalization, Definition, and Classification of Concepts”; “Judgments, with an Emphasis on their Definition, Structure and Classification”; “Kinds of Simple Judgments (i.e. Categorical Judgments)”; “Kinds of Compound Judgments”; “Inference and Direct Inference”; “Syllogisms”; “Disjunctive, Hypothetical, and Relational Inference”; “Inductive Inference”; “The Method of Identifying Causal Connections between Phenomena, i.e. the Five Methods for Searching Causation of Mill”; “Analogy”; “Hypothesis”; “Proof”; “Errors in Proving”; and “The Fundamental Laws of Logic”. Compared with the former, this latter textbook contained more material related to compound judgments and their inferences.

Soviet textbooks on logic possess a number of common characteristics, as follows: the first is the confinement of their content to traditional formal logic, and mainly

to Aristotelian logic, that is to categorical propositions and their inferences. Apart from such instances, there also exist textbooks which are richer with regard to the propositional logic of the Stoics, and thus compound propositions and their inferences. For the most part, however, these textbooks all contain the inductive logic of Bacon and Mill. The second common feature is that they all endeavour to found their interpretations of logical principles on the basis of Marxist philosophy, and thus to expound on concepts, judgments, inferences, truth and fundamental laws of logic in accordance with materialist dialectics. These logical textbooks also contain quite a lot of ontology and epistemology-related contents, while some textbooks even include chapters that straightforwardly discuss the relationship between formal logic and materialist dialectics.

Soviet textbooks of this kind shaped the basic pattern of Chinese textbooks on logic issued in the following two or three decades. By and large, the structure of these textbooks unfolds in the following sequence: the object and meaning of logic, concepts, categorical judgments, compound judgments, direct inference and syllogisms, inference of compound judgments, traditional logic of induction, proof and refutation, and the fundamental laws of logical reasoning. Only a few textbooks placed topics like the law of identity, law of contradiction, law of excluded middle and law of sufficient reasons in the second chapter, while some of them discussed these in the final chapter. In their investigation of logical principles and problems, these textbooks strived to implement the position, viewpoints, and methodology of Marxist philosophy.

Let us mention in passing that as late as in 1981 the Shanghai People's Publishing House still published a translation of a new Soviet textbook on logic, *Formal Logic* (*Formalnaya logika*) edited by I. Y. Chupakhin and I. N. Brodsky. This book, which was originally published in 1977, was an approved textbook used at departments of philosophy at Russian universities and already greatly differed from the former Soviet textbooks on logic, in the sense that it principally absorbed the content of modern mathematical logic. Its content was structured as follows: "Introduction"; part one, entitled "General Logic: Elementary Logical Forms and Methods of Thinking", which consists of five chapters: "Concepts, Judgments, with the Main Focus on Categorical Judgments, while also Touching upon Compound Judgments and Modal Judgments"; "The Fundamental Laws of Formal Logic, i.e. the Laws of Identity, Contradiction, Excluded Middle and Sufficient Reason"; "Inference, Speaking Mainly about Categorical Inference and its Syllogisms, Inference of Compound Judgments and Inductive Reasoning, etc."; "Logical Method of Scientific Thought, Mainly Discussing Categories, Definitions, Proof and Refutation, Method of Axiomatization, the Five Methods of Searching Causation, Hypothesis and Method of Probability, etc.". Part two was entitled

“Symbolic Logic”, and encompassed the following six chapters: “Truth Tables and Normal Formulae of Propositional Logic”; “Natural Deduction of Propositional Logic”; “Formalised Syllogisms”; “Natural Deduction of Predicate Logic”, and “Modal Logic”. Quite evidently, this represents a sample structure for an attempt to conjoin the contents of traditional formal logic and modern mathematical logic within one textbook. Although such attempts have the disadvantage of excessively mixed and disorderly contents, lacking in internal connectedness, in the final analysis they made an important first step in the direction of integrating traditional logic and modern mathematical logic.

The Great Debates on Questions of Logic under the Leadership of Mao Zedong

In the first half of the 20th century, two major debates on questions about logic took place within the Chinese academic world, behind both of which there lurked the shadow of Soviet ideology.

Around the 1930s, with its centre in the Soviet Union, in China arose a tide of rejecting formal logic by means of dialectics. In the year 1930, a widescale criticism of Deborin’s school of thought broke out in Soviet philosophical circles, which itself also incorporated an overall rejection of formal logic and so on as being equal to metaphysics (in contrast to dialectics). This served as a background for the Chinese criticism and rejection of formal logic in the 1930s. In 1940, Stalin rehabilitated formal logic, and the criticism of formal logic in Soviet philosophical circles was temporarily announced as concluded, so that by 1947 the teaching of formal logic was reinstated in the Soviet Union. In 1950, after Stalin issued the document “Marxism and Problems of Linguistics”, which affirmed the functions of formal logic, its position in the Soviet Union changed radically. These later developments served as the background of the development of Chinese logic in the 1950s. (Ju 2013, 8)

Back in the 1930s, a few leftist intellectuals, like Xu Kaixing 许凯兴, Guo Zhanbo 郭湛波, Ye Qing 叶青, Ai Siqi 艾思奇, Pan Zinian 潘梓年, Li Da 李达 and others, under the influence of contemporary Soviet ideology, authored a series of articles in which they equated formal logic with idealism on one side, and metaphysics as the counterpart of dialectics on the other. In their writings, the authors even demanded that the status of formal logic as an academic discipline or science should be revoked. Similar views were also upheld by Mao in the first edition of

his classic work “On Contradiction” (*Maodun lun* 矛盾论; 1937), but were later deleted from the subsequent editions of the text. In 1954, Ma Te 马特 published the short booklet entitled *On the Rudimentary Rules of Logical Thinking* (*Lun luoji siwei de chubu guilü* 论逻辑思维的初步规律), in which he maintained that while formal logic represents an inferior form of logic, dialectical logic represents an advanced form, and thereby rekindled the great polemic on the relationship between formal logic and dialectics. Later, in 1956, Zhou Gucheng 周谷城 published an article entitled “Formal Logic and Dialectics” (*Xingshi luoji yu bianzhengfa* 形式逻辑与辩证法), in which he advanced his theory of “master and subordinate”: dialectics is the master and formal logic its subordinate; although the master and subordinate differ from each other, they can never be separated. This theory posed a direct challenge to the “theory of inferior and advanced”. Consequently, Zhou’s article not only gave rise to a great controversy, but also attracted the attention of Mao Zedong. As a consequence, Mao read many articles that were published in the framework of the then polemics on logic, and also personally convened several public conferences on the topic, calling for their conformity with the official motto “let a hundred flowers bloom and a hundred schools of thought contend” (*baihua qifang, baijia zhengming* 百花齐放, 百家争鸣), and expressing his own support for the ongoing great debate on questions of logic. On November 4, 1957, Mao invited a group of philosophers and logicians to join him at Zhongnanhai 中南海, the headquarters of the Communist Party of China, to conduct a discussion on the questions about logic. Among the invited scholars were Jin Yuelin, Zhou Gucheng, Wang Fangming 王方名, and Huang Shunji 黄顺基. Before and after that event, Mao also met on many occasions with his friend Zhou Gucheng, together with whom he investigated the problematics relating to logic and whose views he also often openly supported (see Xu 2018; Feng 2007). By virtue of Mao’s participation, and under his support or even leadership, the great debates on the questions about logic were not only conducted in an atmosphere of extreme enthusiasm, but also continued for many years. The pertinent papers that were published in that period in Chinese periodicals were later collected in three major volumes of *The Anthology of Discussions on the Questions about Logic* (*Luoji wenti taolun ji* 逻辑问题讨论集), and published in the years 1959, 1960, and 1962 by the Shanghai People’s Publishing House.

The principal questions about logic that were put under discussion in the 1950s and 1960s—such as the relationship between formal logic and dialectical logic, the object, characteristics and use of formal logic, the objective foundations of formal logic, the relationship between veracity and correctness in formal inference, the revision, remodelling and developmental directions of formal logic, inductive inference and methods (cf. Wu 1979)—were not at all technical questions of logic

in the strictest sense, but rather a set of philosophical questions about logic. I once commented that, on one hand, these debates have positive consequences such as the disassociation of formal logic from idealist philosophy and metaphysics (in contrast to dialectics), and the founding of its basis on Marxist philosophy, whereby it regained legitimacy from the current official ideology, which later enabled it to become disseminated, popularized and regain a certain degree of advancement. On the other hand, the same discussion also produced some negative consequences, such as: 1) Under the Soviet influence, the subject of these discussions was limited almost exclusively to traditional formal logic, while insufficient attention was devoted to the new mathematical logic, which was sometimes even the subject of a rejectionist attitude and criticism. In this way, Chinese research on logic had lost the chance to get back in step with international currents in the field, which critically delayed and slowed down the entire process of its modernization. 2) By filling the pages of logical treatises and textbooks with numerous concepts and categories from philosophical epistemology and dialectics, a wide variety of technical questions of logic, which had originally been philosophically neutral, had also gained an overinflated philosophical label. Thus, instead of being considered as an instrument of philosophy, as had been the case originally, logic became overly dependent on philosophy. 3) In certain segments of the Chinese circle of logicians, it fostered a shallow academic atmosphere, where no concrete or creative research on logic itself was conducted, and where, instead, scholars would commit their work to studying a series of obsolete theoretical questions and engage in irrelevant philosophical chatter (cf. Chen 2000, 9–10).

Two Major Waves of Popularization of Logic in China

In the 1950s and 1960s, as a political leader with absolute authority, Mao Zedong often discussed or even stressed in official party documents that in writing their articles people should conform to logic, and thus that the cadres employed by the Party and government administration ought to study logic. Following his public appeals, the cadres and young students set off a surge in studying logic, thus forming the first major wave of popularization of logic in China. At that time a few relevant groups were established in the country, which focused on selecting and reprinting Chinese and foreign treatises on logic that had previously been published in Chinese. Thus, for instance, in 1960s the SDX Joint Publishing Company (Sanlian shudian 三联书店) edited and issued the *Logic Book Series* (*Luoji congkan* 逻辑丛刊), which comprised the following 11 volumes: *Organon* (Francisco Furtado and Li Zhizao, transl. and com.); Mill's *System of Logic* (Yan Fu, transl.); *Logic Primer* (written by Jevons and translated

by Yan Fu); *Logic* (by Jevons, translated by Wang Guowei); *Outline of Logic* (*Lunlixue gangyao* 论理学纲要, by Wataru Totoki 十时弥, translated by Tian Wuzhao 田昊焯); *New Logic* by Zhang Zihe; *Outline of Logic* by Tu Xiaoshi; *Logic* by Jin Yuelin; *Essentials of Logic* by Zhang Shizhao; *Logic and the Science of Logic* (*Luoji yu luojixue* 逻辑与逻辑学, by Pan Zinian 潘梓年; 1937); and *Selected Translations from History of Logic* (*Luoji shi xuanyi* 逻辑史选译, by T. Ziehen et al., translated by Wang Xianjun). To answer Mao's appeals, the five foremost senior Chinese experts in logic—Jin Yuelin, Wang Dianji, Shen Youding, Zhou Liquan and Zhang Shangshui 张尚水—took action and composed the book *An Everyday Reader in Logic* (*Luoji tongsu duben* 逻辑通俗读本). The work was comprised of five chapters, discussing primarily topics such as concepts, judgments, inference, the fundamental laws of formal logic, and argumentation (proof and refutation). The special features of this work are its conceptual clarity, succinctness, and comprehensibility, which made it suitable for being used by beginners in formal logic. The first edition of the book was issued in 1962 and reprinted in 1964, while it was reissued in a revised version in 1978, this time under the title *A Concise Reader in Formal Logic* (*Xingshi luoji jianming duben* 形式逻辑简明读本). The last version was reprinted several times, reaching a very wide readership, and influencing quite a few generations of Chinese readers.

In 1977, under the presidency of Deng Xiaoping, the entrance system was reinstated in Chinese universities. Consequently, in the following year, Chinese universities welcomed the first generation of students after the Cultural Revolution to have been accepted in their studies by virtue of their final college exams. In the same year, the state re-promulgated the official appeal to “March towards science” (*xiang kexue jinjun* 向科学进军), causing the generation of youth to long for new knowledge and making the reading of books a common trend in the entire Chinese society. Still under the influence of Mao, at the time almost all university students, no matter whether focusing on the humanities or on natural sciences, were obliged to take a course in logic. As a learning requirement for those who were unable to enter universities, the state set up the Self-Taught Higher Education Examinations for adults, where, in many fields of study formal logic was listed as a compulsory subject. In 1981, Peng Yilian 彭漪涟 and Yu Shihou 余式厚 co-authored the book *Fun with Logic* (*Quwei luojixue* 趣味逻辑学), which focused on explaining logical principles by telling stories, and offered a great degree of accessibility for the common reader, because of which the book was widely welcomed in Chinese society. Until this day, I still clearly remember the joy and delight with which I read this book. In 1984, the Ministry of Education commissioned Wu Jiaguo 吴家国 to compile the work *A Synopsis of General Logic for Self-Taught*

Examinations (*Putong luoji zixue kaishi dagang* 普通逻辑自学考试大纲; 1986). Five years later Wu and Ma Yuke 马玉珂 coedited a volume entitled *Principles of General Logic* (*Putong luoji yuanli* 普通逻辑原理; see later edition Ma 1997), which sold very many copies. Apart from the regular university studies and self-study higher education examinations for adults, there also existed various forms of non-governmental schools, the most wide-ranging and influential of which was the China Correspondence University of Logic and Languages (*Zhongguo luoji yu yuyan hanshou daxue* 中国逻辑与语言函授大学). According to the introduction from its official website, this university was opened in 1982 and has now educated more than half a million students, the majority of whom specialized in formal logic. From the 1980s until the start of this millennium, logic training classes for self-taught examinations blossomed all over the country, so that even university teachers in logic started teaching logic at various places outside of their universities to make more money. At the same time, the sales of books on logic skyrocketed; some of them easily sold in tens or even hundreds of thousands of copies, while some sold in the millions. We can call this stage the second major popularization of formal logic in China.

On a brief note, allow me to mention that, in the following years, two of my own books on logic have also proved very effective in disseminating and popularizing knowledge in this field: the first was entitled *What is Logic?* (*Luojixue shi shenme?* 逻辑学是什么?), the second *Fifteen Lectures on Logic* (*Luojixue shiwu jiang* 逻辑学十五讲). The books were published in the *Experts' Courses in General Knowledge Book Series* (*Mingjia tongshi jiangzuo shuxi* 名家通识讲座书系) by Peking University Press in the years 2008 and 2016, respectively. Both garnered a wide acclaim among readers, and both sold several hundred thousand copies.

The Development of General Education in Logic at Chinese Universities

The development of teaching logic at Chinese universities in the period between 1949 and 2019 can be clearly divided into two stages, that is, before and after Deng Xiaoping's reforms and the opening of China to the outside world. Considering the importance of logic education, in the following paragraphs we shall cast some light on this development by means of a relatively extensive overview of the logic textbooks used in PRC in the above-mentioned two periods.

In the 1960s, due to its close relations with Soviet academia, the Renmin University of China ("RUC" for short) (*Zhongguo Renmin daxue* 中国人民大学) became a major centre of Chinese higher education. Already back in 1958, the

university's teaching and research section for logic compiled the work *Formal Logic* (*Xingshi luoji* 形式逻辑), whose content is quite close to that of the Soviet logic textbooks. It consisted of twelve chapters, as follows: "Introduction"; "On the Object and Meaning of Formal Logic"; "Concepts"; "Judgments"; "The Fundamental Laws of Formal Logic"; "Inference"; "Direct Inference"; "Categorical Syllogisms"; "Hypothetical and Disjunctive Syllogisms"; "Inductive Inference"; "Analogy and Hypothesis"; "Proof". In addition to these, the chapter on judgments was also followed by an appendix on the expression of concepts and judgments in Chinese language. Thereafter, investigation of special manifestations and applications of traditional formal logic in the Chinese language became one of the main special features of logic textbooks compiled at RUC. Later, the book was reprinted several times. The second edition appeared in 1980, and the second revised edition in 1984. Even though the contents in the second edition were still almost the same as in the first, the second contained two additional appendices: "Logical Analysis of Argumentative Treatise" and "A Brief History of Logic". As pointed out by Zhuge Yintong 诸葛殷同, "having had an immense circulation within the country, these two volumes produced a profound and long-lasting impact" (Zhuge 1997, 151).

In 1962 Jin Yuelin took charge of the compilation of the textbook *Formal Logic* (*Xingshi luoji* 形式逻辑), which was intended for use in the humanities at national colleges and universities. Other scholars who took part in creating the work were mostly senior Chinese experts in logic, like Wu Yunzeng 吴允曾, Zhou Liquan, Yan Chengshu 晏成书, Zhuge Yintong, and so on. The final version of the first draft of the book, which was completed by the following year, was later compiled by Zhou Liquan and reached its final form in 1965. However, due to the breakout of the Cultural Revolution, the launch of the book was postponed until 1979, when it was finally published. Although this book is essentially limited to traditional formal logic, its content was considerably expanded in comparison with the above-mentioned Soviet textbooks. It consisted of the following seven chapters: "The Object and Uses of Formal Logic"; "Concepts"; "Judgments, Involving Categorical, Relational, Compound, and Modal Judgments"; "Deductive Inference, Including Direct Inference, Syllogisms, Relational Inference, Inference of Compound Judgments and Modal Inference"; "Inductive Inference"; "The Fundamental Laws of Formal Logic, Focusing Only on the Laws of Identity, Contradiction and the Excluded Middle, and not Mentioning the Law of Sufficient Reason"; "Argumentation, Discussing Both Proof and Refutation". The book also contained one appendix on resources in the history of logic. Overall, this textbook is an example of an outstanding work on traditional formal logic, whose major and most important features are the conciseness of its content, the precision of its exposition on the subject, the elegant and succinct writing style,

carefully selected examples, and meticulously designed selection of exercises. Back in those years I conscientiously read the book several times and completed each and every exercise contained therein, establishing the initial foundations of my knowledge and technical mastery of logic using this book.

After the end of Cultural Revolution in 1976, China embarked upon an entirely new path. In May 1978, a nationwide symposium on logic was held in Beijing, at which Zhang Jialong 张家龙 presented his report entitled “Modernization of Formal Logic” (*Xingshi luoji de xiandaihua* 形式逻辑的现代化), in which he raised his critique of several problems in teaching material on traditional logic in Chinese national education. Moreover, in his report Zhang proposed enriching and developing traditional logic with modern logic by compiling a new generation of logic textbooks that would incorporate the spirit, content, and methodology of modern logic. At the second national symposium on logic, in August 1979, Wang Xianjun gave a lecture entitled “Modernization of Logical Curricula” (*Luoji kecheng de xiandaihua* 逻辑课程的现代化), in which he proposed the universal reform of academic programs and courses in logic offered to students of the humanities at Chinese colleges and universities, that is, to modernize their contents. Subsequently, the policies favoured by Zhang and Wang gave rise to an intense debate on the “modernization of logic” that went on for more than ten years. In the course of debate, three main positions on how to modernize logical curricula were formed: the first was the “theory of replacement”, that is to replace traditional formal logic with mathematical logic; the second was the “theory of assimilation”, that is to assimilate some contents from mathematical logic into the framework of traditional logic; and the third was the “theory of coexistence”, which maintained that traditional formal logic on one side and mathematical logic on the other both have their advantages and both are needed, and must therefore be offered separately while maintaining a harmonious coexistence. Following a few decades of development, the ultimately prevailing form of teaching material are the textbooks on “introductory logic”, combining both traditional and modern logic.

The most successful textbook in the category “theory of assimilation” is the work *General Logic* (*Putong luoji* 普通逻辑), edited by Wu Jianguo. This was the main textbook in logic for studies in the humanities at national colleges and universities, the compilation of which was organized by the Ministry of Education. It was composed by eleven renowned teachers of logic from various Chinese universities, while the compilation of the final manuscript was done by Wu Jianguo. The book was finally published in 1979 by the Shanghai People’s Publishing House. Afterwards it underwent three revisions, having been released in four different editions, each time incorporating more and more contents related to modern logic. In 1995,

the book was awarded the “First Prize of the Third Awards for Excellent Textbooks in General Higher Education” by the National Education Committee. The total number of copies printed to date has probably exceeded three million, which testifies to the extensive use and huge influence of this book. Wu later wrote an article speaking about the guiding ideas behind the compilation of this textbook:

The bulk of general logic must consist of the quintessential features from traditional logic, and must be suitable for absorbing the basic knowledge of mathematical logic, forming a teaching system combining the two kinds of logic; logical form must not only include deductive but also inductive inferences; the rules of syllogism can be divided into structural rules, general rules and rules of derivation, which differ from each other in their respective level; the scopes of application of laws of contradiction and excluded middle possess no distinction in broadness and narrowness; the law of sufficient reason can be retained, but not as a universal logical law but as a law of argumentation; in argumentation, the methods and rules of proving need to be harmonised with each other in order to eliminate logical contradictions. (Wu 2004, 117)

As a result of Deng Xiaoping’s reforms, the circle of Chinese logicians started gradually gaining greater familiarity with the situation in logic education in the West. Consequently, a few textbooks written in English soon became the subject of serious study by a certain group of Chinese logicians. Under the planning and preparations of myself, three textbooks on logic, widely used at Western universities, were translated into Chinese and published: the eleventh edition of *Introduction to Logic* (*Luoji xue daolun* 逻辑学导论) by Irving M. Copi et al. was translated into Chinese by Zhang Jianjun 张建军 and others, and published in 2007. A Chinese translation of the thirteenth edition of the textbook was produced and published in 2014. This work became immensely popular, and until this day remains a bestseller among such textbooks in China. Secondly, the tenth edition of Patrick J. Hurley’s *A Concise Introduction to Logic* (*Jianming luojixue daolun* 简明逻辑学导论) was translated by myself, Song Wengan 宋文淦 and others, and published in 2010. And, thirdly, the ninth edition of H. Kahane’s *Logic and Philosophy: A Modern Introduction* (*Luoji yu zhexue: xiandai luoji daolun* 逻辑与哲学: 现代逻辑学导论) was translated into Chinese by Zhang Jianjun and others, and published in 2017. Apart from those works, Hu Zehong 胡泽洪 and others also produced a translation of Copi’s *Essentials of Logic* (*Luoji yaoyi* 逻辑要义 (2013)).

Under the influence of Western logic textbooks, a succession of work of the type “an introduction to logic” were compiled and published in China. The first

noteworthy such textbook was the *New Course in Logic* (*Xin luoji jiaocheng* 新逻辑教程) edited by Song Wenjian 宋文坚 and authored by Zhou Beihai 周北海, Liu Zhuanghu 刘状虎, Li Xiaowu 李小五, Deng Shengqing 邓生庆 and others, which was published in 1992. In this work prominence is given to a framework set around modern logic, focusing mainly on elaborating the basic content of modern deductive and inductive logics. It consists of the following nine chapters: “The Object, Methodology, and Meaning of Logic”; “Formulae, Truth Tables, Normal Formulae, and Formal Proof of Propositional Logic”; “Propositional Calculus”; “Traditional Predicate Calculus”; “Formulae of Predicate Calculus”; “Operations, Inference and Proofs in Predicate Logic”; “Modal Logic”; “Naïve Set Theory”; “Inductive Logic”. Based on this textbook, a group of members of the teaching and research section for logic at Peking University compiled another book, *Logic* (*Luoji xue* 逻辑学), the compilation of which was supervised by Song Wenjian as editor-in-chief and Guo Shiming 郭世铭 as assistant editor. This book, which was first published in 1998 by the People’s Publishing House, consisted of seven chapters: “Preface”; “Propositional Logic”; “Categorical Logic”; “Monadic Predicate Logic”; “Predicate Logic”; “Inductive Logic”; “Logical Methods”. In addition, the book also contains an appendix: “A Brief Introduction to Applied Logic, Introducing Modal Logic, Temporal Logic, Intuitionist Logic, Many-Valued Logic, and Free Logic”. In comparison with other textbooks, these two volumes already contained a considerable amount of modern logic, and hence also the most systematic, thorough, and accurate exposition of the principles and methodology of modern logic. However, for this reason it was only rarely put to use at Chinese universities.

Between 1984 and 1992, during my tenure in the teaching and research section for logic at RUC, and under my participation and even guidance, my colleagues at that section compiled a textbook entitled *Logic* (*Luoji xue* 逻辑学). The book, which was first issued in 1996, included the following eight chapters: “Preface”; “Propositional Logic”; “Categorical Logic”; “Modal Logic”; “Inductive Logic”; “The Fundamental Laws of Logic”; “Proof and Refutation”; “Fallacies”. This book belongs to the “integrative type” of textbooks on traditional logic and modern logic. Its second and third editions emerged in the years 2008 and 2014, having attained fairly wide use at Chinese universities. Later, after I moved to Peking University, I authored a new textbook *Introduction to Logic* (*Luoji xue daolun* 逻辑学导论) on my own. The book was published in 2003 and consisted of the following six chapters: “Logic is a Science of Inference and Argument”; “Propositional Logic”; “Categorical Logic”; “Predicate Logic”; “Inductive Logic”; “Informal Logic”. Apart from these main chapters it also contained the following appendix: “Formalization Method and Formal Systems”. In the years 2006, 2014, and 2020, the second, third and fourth editions of the book were published, from which

the above-mentioned appendix was omitted. This textbook not only further approached the Western style of “introduction to logic”, but also had extensive use.

Other relatively important Chinese logic textbooks that were published after Deng Xiaoping’s reforms include: *Principles of Formal Logic* (*Xingshi luoji yuanli* 形式逻辑原理 (1982)) by Zhuge Yintong and others; *Introduction to Logic* (*Luoji daolun* 逻辑导论 (1996)) by the teaching and research section for logic of Zhongshan University; *A Course in Logic* (*Luojixue jiaocheng* 逻辑学教程 (1999)) edited by He Xiangdong 何向东; *Introduction to Logic* (*Luojixue daolun* 逻辑学导论 (2000)) edited by Peng Yilian; *Foundations of Logic* (*Luoji jichu* 逻辑基础 (2004)) by Wang Lu 王路; *Introduction to Logic* (*Luojixue daolun* 逻辑学导论 (2005)) by Huang Huaxin 黄华新 and Zhang Zexing 张则幸; *Logic* (*Luojixue* 逻辑学 (2007)) by Hu Zehong and others; *A Basic Course in Logic* (*Luojixue jichu jiaocheng* 逻辑学基础教程 (2008)) by the teaching and research section for logic of Nankai University, as well as the *Logic* (*Luojixue* 逻辑学 (2017)) volume of the Ministry of Education’s “Ma Engineering Project” Key Textbooks (“Ma gongcheng” zhongdian jiaocai “马工程” 重点教材) series, which was edited by He Xiangdong, and composed by a large group of Chinese experts in logic.

Teaching and Research of Mathematical Logic

In China, scholars who engage in work on mathematical logic can be divided into two main groups. The first is the Association for Research in Modern Logic attached to the Chinese Association of Logic (*Zhongguo luoji xuehui* 中国逻辑学会). The majority of the members of this organisation are concerned with education activities and compilation of teaching material relating to mathematical logic, while only a minority engage in research into mathematical logic in the strictest sense. However, in recent years this group has changed rapidly with the arrival of the younger generation of Chinese logicians. The second is the mathematical logic branch of the Chinese Mathematical Society (*Zhongguo shuxue xuehui* 中国数学学会). The members of this group engage to a greater extent in research on mathematical logic, but to a much lesser degree maintain contact and communicate with the members of the Association of Logic, causing the latter to be rather unfamiliar with the research of the former. I myself am one of the representatives of the latter, possessing only a vague idea of the state of research and concrete advances in Chinese mathematical logic. The overview of teaching and research of mathematical logic in China is summarized in this article based on two main sources: the first is the chapter 2 on “Mathematical Logic” by Zhao Xishun 赵希顺 in *Contemporary Chinese Research in Logic 1949–2009* (*Dangdai*

Zhongguo luojixue yanjiu 1949–2009 当代中国逻辑学研究 1949–2009, edited by Ju Shier 鞠实儿, pp. 50–122); the second is my own experience and perception that matured together with Chinese studies in logic following the 1980s reforms.

Between the 1930s and early 1950s, after logicians like Shen Youding, Wang Xianjun, Hu Shihua, Mo Shaokui 莫绍揆, and others returned from their studies abroad, mathematical logic in China started developing. Despite of the influence of Soviet criticism of mathematical logic, by the 1960s teaching and research on this subject in China reached a relatively high level of development. Apart from having compiled and translated several textbooks on mathematical logic, China's leading experts such as Hu Shihua, Mo Shaokui, Shen Youding, and others also published some articles in prestigious international periodicals such as *The Journal of Symbolic Logic*. From the 1970s onwards, a former student of Jin Yuelin, the American–Chinese mathematical logician Hao Wang, often returned to China to lecture. His lectures, which were collected in the book *Popular Lectures on Mathematical Logic* (*Shuli luoji tongsu jianghua* 数理逻辑通俗讲话) and officially published in 1981, enabled contemporary Chinese logicians to better understand the new developmental circumstances and advances in Western mathematical logic.

After the launch of Deng Xiaoping's reforms in 1978, the collection of mathematical logic textbooks that have left the deepest impressions on their readers include Hu Shihua's and Lu Zhongwan's 陆中万 *Foundations of Mathematical Logic* (*Shuli luoji jichu* 数理逻辑基础; 2 volumes, (1981)); Wang Xianjun's *Introduction to Mathematical Logic* (*Shuli luoji yinlun* 数理逻辑引论; (1982)); Mo Shaokui's *A Preliminary Introduction to Mathematical Logic* (*Shuli luoji chubu* 数理逻辑初步 (1980)); *A Course in Mathematical Logic* (*Shuli luoji jiaocheng* 数理逻辑教程 (1982)), and *Theory of Recursion* (*Diguilun* 递归论 (1987)) as well as his translation of S. C. Kleene's *Introduction to Metamathematics* (*Yuanshuxue daolun* 元数学导论; (1987)); Wang Shiqiang's 王世强 *Foundations of Model Theory* (*Moxinglun jichu* 模型论基础 (1987)); Zhang Jinwen's 张锦文 *Introduction to Axiomatic Set Theory* (*Gongli jihelun daoyin* 公理集合论导引 (1991)); Zhu Shuilin's 朱水林 translation of A. G. Hamilton's *Logic for Mathematicians* (*Shuli luoji* 数理逻辑 (1987)), and Yan Chengshu's *Introduction to Set Theory* (*Jihelun daoyin* 集合论导引 (1994)). As I know, the most widely used of these was Wang Xianjun's *Introduction to Mathematical Logic*, while Mo Shaokui's *A Preliminary Introduction to Mathematical Logic* also reached a very broad readership, having had the greatest effect with regard to the dissemination of mathematical logic in China.

In the period following the Deng Xiaoping's reforms, a new generation of outstanding mathematical logicians emerged in China, such as Wu Wenjun 吴文俊, Tang Zhisong 唐稚松, Yang Dongbing 杨东屏, Zhang Jinwen, Zhou Haoxuan

周浩旋, Hong Jiawei 洪加威, Luo Libo 罗里波, Shen Fuxing 沈复兴, Ding Decheng 丁德成, Li Xiang 李祥, Li Wei 李未, Feng Qi 冯琦, Zhang Qingyu 张清宇, Zhang Yi 张羿, Yang Yue 杨跃, and Zhao Xishun, among others. These scholars have produced a great number of international-level research achievements and are all actively engaged in the international frontiers of their fields of research (see Ju 2013, 50–122.). In recent years, in collaboration with Yang Yue and other scholars in Singapore, Hao Zhaokuan 郝兆宽 and Yang Ruizhi 杨睿之 from Fudan University have contributed much to the advancement of research both in set theory and the thought of Kurt Gödel, and also to the compilation of mathematical logic textbooks.

A Period of Flourishing Research in Dialectical Logic

In China, dialectical logic was once generally believed to be a science concerned with studying the forms, methodology, and laws of dialectical thinking. From 1949 to the 1980s, or even up to the early 1990s, represents the period in which dialectical logic flourished in China. In my opinion, this was an aggregate outcome of various different causes: 1) The first resided in the fact that the traditional Chinese philosophy, such as, for example, the *Book of Changes* (*Zhouyi* 周易), the philosophy of Laozi and Zhuangzi, Buddhist philosophy and so on, contained a strong focus on the grand narrative of the universe, having paid particular attention to the circulations and changes underlying the various things and phenomena that exist, thinking about the same question from several different angles, striving to refrain from epistemic stiffness, rigidity, and attachment. All these aspects possess a strong resemblance to dialectical thought. 2) German classical philosophy, represented by Kant and Hegel, has had a great influence on China. As a consequence, Hegel's representative works, popularly referred to as “large logic” and “small logic”, together with his dialectics of “thesis-antithesis-synthesis”, were commonly referred to as “dialectical logic”. 3) Marxist philosophy, which inherited and transformed German classical philosophy, is the official ideology in China, and in some of its classical works “dialectical logic” is often mentioned and advocated. 4) The philosophical circles of the Soviet Union, which for a period of time was revered by China as its “big brother”, all propagated and studied dialectical logic. Some of the related works were also translated into Chinese, including M. M. Rosenthal's *Principles of Dialectical Logic* (*Principy dialekticheskoi logiki; Bianzheng luoji yuanli* 辩证逻辑原理 (1962)), M. N. Alekseyev's *Dialectics of the Forms of Thinking* (*Dialektika form myshleniya; Siwei xingshi de bianzhengfa* 思维形式的辩证法 (1961)), P. V. Kopnin's *Dialectics, Logic, Science* (*Dialektika, logika, nauka; Bianzhengfa, luoji, kexue* 辩证法, 逻辑, 科学 (1981)) and *Dialectics as*

Logic and Epistemology (*Dialektika kak logika i teoriya poznaniya; Zuowei renshilun he luoji de bianzhengfa* 作为认识论和逻辑的辩证法 (1984)). All these works had a great impact on Chinese academia.

In the 1980s and 90s, several Chinese research treatises and even textbooks on dialectical logic were published in China. The domestic research on dialectical logic can be summarized with a list of the following seven research directions: comparative research on dialectical and formal logic; research on the theory of categories; research on the methodology of sciences; research on non-classical logics; dialectical examination of new results on modern logic and philosophy of logic; research on the practical applications of dialectical logic; studies in the intellectual history of dialectical logic (cf. Ju 2013, 375–86). Zhou Liquan's *Hegel's Dialectical Logic* (*Heiger de bianzheng luoji* 黑格尔的辩证逻辑; 1989) is a representative contribution in the framework of the last kind of approach. Although within the framework of these studies there also emerged many valuable insights and achievements, generally speaking, due to unclear distinctions between dialectical logic and dialectical materialism, the logical colouration of their results was rather weak, which is also why they have not attained wide recognition or approval. Consequently, since the beginning of the 21st century, dialectical logic has gradually withdrawn to the fringes of the Chinese academic world, to the degree that it is today very difficult to detect any signs of its presence.

Continuous Advance of Research in the History of Chinese Logic

In my opinion, between the years 1949 and 2019, in comparison with other branches of the science of logic, the history of Chinese logic is a field of research which made significant progress and attained plentiful results in China, and, at the same time, is still brimming with controversies and enthusiasm. I concur with the following generalizations: in this period of time

research in history of Chinese logic can be roughly divided into three periods, namely, the opening period of research in history of Chinese logic in the first 17 years since the founding of PRC, the period of scientific construction of history of Chinese logic in the 1980s, and the period of deepening and reassessment of the research in history of Chinese logic from the 1990s up to the present day. ... the differentiating feature between the second and third period was marked by the publication of the key item *History of Chinese Logic* (five volumes) in 1989, which was commissioned in the framework of the national Sixth Five-Year Plan. On

the other hand, while the main subject of the former period consisted in founding history of Chinese logic as an academic discipline, in the latter period equal stress was laid both on research and reassessment, in the course of which several different positions on Chinese logic took shape. (Ju 2013, 396)

The representative achievements of the first period include the following publications: Shen Youding's *Logic of the Mohist Canon* (*Mojing luojixue* 墨经逻辑学; first published as a series of papers in 1960 and then as a collected work in 1980), Zhan Jianfeng's 詹剑峰 *Mohist Formal Logic* (*Mojia de xingshi luoji* 墨家的形式逻辑 (1956)), and Wang Dianji's *History of Logical Thought in China* (*Zhongguo luoji sixiang shi* 中国逻辑思想史, completed in 1960, published in 1979), *An Analysis of Historical Material on Logical Thought in China* (*Zhongguo luoji sixiang shike fenxi* 中国逻辑思想史料分析 (1961)) as well as a series of his articles from the period under discussion (cf. *ibid.*, 399).

Below we will focus our discussion on the last two periods of studies on the history of Chinese logic. Attempts to answer questions such as how we should actually carry out research on the history of Chinese logic, what kind of interpretational frameworks should be adopted, gave rise to controversies and disagreements among different researchers, and especially among different generations of researchers, and in turn also to several different approaches. By and large, however, we can distinguish between two major approaches, as follows.

The first approach chose from certain Western (in a narrow or general sense) theories of logic—such as, for example, traditional formal logic, mathematical logic, informal logic, theories of argumentation or semiotics—to serve as the interpretational framework for the relevant logical material in Chinese classics. These background theories were thus used to reconstruct ancient Chinese logic, while judgments were then made by means of comparative research on the advantages and disadvantages of such logics. For the most part, the scholars furthering this kind of approach emphasized the generality of human thought and universality of logical theories, making use of Western theories of logic in their hermeneutics of Chinese classics, and closely pursuing the ideas of unity, resemblance, and fusion between Chinese and Western theories of logic. As the framework of their interpretations, some scholars chose Western traditional formal logic, while some of them even went as far as to choose ideas, methods, and techniques from modern mathematical logic. The representative achievements of this kind of research include the monumental five-volume work *History of Chinese Logic* edited by Li Kuangwu 李匡武 (1989), which was an achievement of one of the key-projects of the national Sixth Five-Year Plan. Apart from this large-scale work, the

following titles are also among the main achievements of such efforts: the series *Selected Material in History of Logic in China* (*Zhongguo luoji shi ziliao xuan* 中国逻辑史资料选; 5 volumes (1991)) published as a complement to the former, Sun Zhongyuan's 孙中原 *History of Logic in China (Pre-Qin Period)* (*Zhongguo luoji shi (xian-Qin juan)* 中国逻辑史(先秦卷) (1987)), and *Studies in Chinese Logic* (*Zhongguo luoji yanjiu* 中国逻辑研究 (2006)), Zhou Yunzhi's 周云之(ed.) *History of Chinese Logic* (*Zhongguo luoji shi* 中国逻辑史 (2004)), and so on. Other scholars, like Song Wenjian, Cheng Zhongtang 程仲棠 and Wang Lu, have also insisted on using Western formal logic for interpreting the material found in Chinese classics. At the same time, however, they merely regarded formal logic as a theory of inferential form, capable of guaranteeing that certain conclusions necessarily follow from their premises. Based on their research, in ancient China there did not exist anything similar to Aristotelian logic, which leads to the conclusion that in Chinese antiquity there was no logic as such—but only discourses like the science of names (*mingxue* 名学), science of disputation (*bianxue* 辩学), and science of argumentation (*lunbianxue* 论辩学). Moreover, researchers like Li Xiankun 李先焜, Cai Boming 蔡伯铭, Chen Zongming 陈宗明, Chen Daode 陈道德, Zeng Xiangyun 曾祥云 and others maintained that semiotics is a better paradigm for studies on the history of Chinese logic. The traditional manner of considering Western formal logic as the paradigmatic research, and then randomly cutting off any material from ancient Chinese classics and subjecting it to causal interpretation, can never be coherent, but commits serious systemic mistakes of deviating from the original meaning of those classics, drawing simple parallels between the Chinese and the Western, etc. On the other hand, adopting a semiotic paradigm and regarding ancient Chinese logic as a form of semiotics of a natural language incorporating syntax, semantics, and pragmatics, can be more faithfully decipher the entirety and the original meaning of ancient Chinese classics, and consequently produce more rational and accommodating interpretations. In this regard, the most representative research results include Chen Zongming's *Chinese Pragmatic Thought* (*Zhongguo yuyongxue sixiang* 中国语用学思想 (1997)), Lin Mingjun's 林铭钧 and Zeng Xiangyun's *A New Exploration of the Sciences of Names and Disputation* (*Ming-bianxue xin tan* 名辩学新探 (2000)), and Chen Daode's and Zeng Xiangyun's *Studies in Pre-Qin Sciences of Names and Disputations in the Perspective of Semiotics* (*Fubaoxue shiye xia de xian-Qin ming-bianxue yanjiu* 符号学视野下的先秦名辩学研究 (2017)).

The second approach strives to emphasize the interrelatedness between logic and culture, advocating the use of comparative methods founded on “historical analysis and cultural hermeneutics” in our attempts to interpret and construct ancient Chinese logic on the basis of the original characteristics of Chinese culture. This

approach gives prominence to the differences in modes of human thought and particularities of logical theories within different cultures, opposing the attempts at forcefully inculcating Chinese logical material into the framework of Western logic and using the later for drawing oversimplified parallels between the two. The majority of the proponents of this approach have earned their doctorates under the scholarly influence of Professor Cui Qingtian 崔清田 at Nankai University, who is considered to have been the nucleus of formation of the “Nankai School” of studies in the history of Chinese logic.³ Cui maintains that:

Logic is the science of the structure and form of logical thinking, which is influenced by culture. It not only possesses logical commonalities but also particularities. With commonalities we refer to fixedness of the nature of logic, of which the common object is the most elementary. Particularities, on the other hand, designate those features of logic that appear within different historical and cultural contexts, such as the differences between prevailing types of inferences, as well as the discrepancies between the methods of formulating forms of inferences. Taking this kind of view on logic as a precondition and foundation, one can disapprove of the view that Western traditional logic and modern formal logic are the only kind of logic, recognising those logics that derive their differences from their cultural backgrounds and possess their own characteristics. Hereby we can also confirm that “Chinese logic” is a form of learning within Chinese national learning and was not merely discovered within Chinese studies of Western logic. “Chinese logic” thus contains commonalities identical to those of Western science of logic, while at the same time also possesses particularities which differ from those of the latter. (Cui 2011, 49)

The principal achievements obtained in this way posit that Chinese ancient logic constitutes the science of names and science of disputation that are different from traditional formal logic, of which the latter uses “*tuilei* 推类” as the leading type of inference. Moreover, its *tuilei* has got the characteristics of analogical reasoning and belongs to probabilistic inferences. The representative results of this option include: *A Coursebook in History of Chinese Logical Thought* (*Zhongguo luoji sixiang shi jiaocheng* 中国逻辑思想史教程; 1988 first edition, 2001 second edition) edited by Wen Gongyi 温公颐 and Cui Qingtian; *Science of Names and Science of Disputation* (*Mingxue yu bianxue* 名学与辩学 (1997)) edited by Cui Qingtian; *A Comparative Study of Mohist Logic and Aristotelian Logic* (*Mojia luoji yu Yalishiduode luoji bijiao yanjiu* 墨家逻辑与亚里士多德逻辑比较研究 (2004)) by Cui

3 For English versions of Cui’s studies, see Cui (2005; 2021).

Qingtian; *A Study of the Pre-Qin Science of Names (Xian-Qin mingxue yanjiu 先秦名学研究* (2004)) by Zhai Jincheng 翟锦程; *Research on Tuilei Logic in Ancient China (Zhongguo gudai tuilei luoji yanjiu 中国古代推类逻辑研究* (2012)) by Liu Mingming 刘明明, and *A New Theory of Pre-Qin Logic (Xian-Qin luoji xinlun 先秦逻辑新论* (2017)) by Zeng Zhaoshi 曾昭式.

Following the path of emphasizing the interrelatedness of logic and culture, Ju Shier went even further, positing that logical theories are influenced by different elements such as cultural factors, social environment, motivations of the cognitive subject, etc. The logic of different cultures is thus bound to possess different characteristics; maybe it could even be claimed that different cultures are also likely to have different logics. Moreover, cultural relativism and logical diversity cannot be tolerated by the formal and informal logics which can be found in Western tradition. Ju also proposed a general theory of argumentation, advocating its application as the framework for the reconstruction of history of Chinese logic (see Ju 2010). Working with his PhD students, Ju published a series of research articles advancing this kind of approach, although no systematic monograph has yet been published on the topic.

Here it also needs to be mentioned that in the last ten years several other monographs have been published which summarized and reassessed Chinese logical studies over the course of the last century. Works of this type include, for example, *A Century of Studies in Logic (Luoji xue bainian 逻辑学百年* (1999)) edited by Zhao Zongkuan 赵总宽; *Importing and Studying Western Logic (Luoji xue de chuanru yu yanjiu 逻辑学的传入与研究* (2005)) by Song Wenjian, as well as *Contemporary Chinese Research in Logic 1949–2009* edited by Ju Shier, which is frequently cited in this study.

Chinese research on Indian *hetuvidyā* (*yinmingxue* 因明学) consists of studies of logic in Tibetan and Chinese Buddhist scriptures. In this respect, I concur with the following claims:

New Chinese research of *hetuvidyā* in Chinese Buddhist literature can be further divided into three main stages: the first stage lasted from 1949 to 1966 ..., the time when it takes no fashion; the second period lasted from the start of Cultural Revolution to its end, when on the continent research and teaching of *hetuvidyā* was completely stopped; the third stage lasts from 1978 up to the present day, and represents the time when research in *hetuvidyā* was revived and entered a new period of flourishing. (Ju 2013, 397)

As far as I am aware, in the third period at least three researchers have made outstanding achievements: the first is Shen Jianying 沈剑英, whose representative

works include *Studies in Hetuvidyā* (*Yinmingxue yanjiu* 因明学研究 (1985)), and *Studies in Buddhist Logic* (*Fojiao luoji yanjiu* 佛教逻辑研究; 2013); the second is Zheng Weihong 郑伟宏, who is the author of several works on *hetuvidyā*: *Literal Explanation of the Nyāyamukha* (*Yinming zhengli men lun zhibjie* 因明正理门论直解 (2008)), *Studies in Hetuvidyā in Chinese Buddhism* (*Hanchuan Fojiao yinming yanjiu* 汉传佛教因明研究 (2007)), *Collated and Annotated Commentary on Nyāyamukha with Modern Translation and Studies* (*Yinming dashu jiaoshi, jinyi, yanjiu* 因明大疏校释、今译、研究 (2010)), and *A General Survey on Buddhist Logic* (*Fojiao luoji tonglun* 佛教逻辑通论 (2016)); and the third is Zhang Zhongyi 张忠义, whose works include *A New Theory of Hetuvidyā* (*Yinming xinlun* 因明新论; ed. (2006)), *Hetuvidyā* (*Yinming* 因明; ed. (2007)), and the monograph *Boring into Hetuvidyā* (*Yinming lice* 因明蠡测 (2008)). At the beginning of the 21st century, *hetuvidyā* was included in the national plan of “rescuing disappearing sciences” (*qiangjiu juexue* 抢救绝学), and has since received enormous support. As a result, many newly graduated doctors of philosophy engage in research on *hetuvidyā*, and this field of studies is experiencing great enthusiasm, with many thriving areas of work.

The Lonesome Advance of Studies in the History of Western Logic

Compared with the research on the history of Chinese logic, it appears that Chinese studies on the history of Western logic have never reached the same level of popularity. Accordingly, the number of scholars who continue pursuing this field has remained relatively low, yet at the same time they have also seen considerable achievements and made quite significant progress.

In the period before the Deng Xiaoping reforms, systematic research on the history of Western philosophy was still rare in China. As a rule, “a brief history of logic” could only be found in logical textbooks, often only in the form of appendices. In this period, a few treatises on history of logic were translated into Chinese, such as *Selected Translations from History of Logic* (*Luoji shi xuanyi* 逻辑史选译 (1961)) by T. Ziehen et al., and *History of Modern Logic* (*Istorija logiki novogo vremena; Jindai luoji shi* 近代逻辑史 (1964)) by P. S. Popov, both translated by Wang Xianjun and others. Still, a comparatively more systematic research into Aristotelian logic was provided by Zhou Liquan in a series of articles, which included “Aristotle’s Logical Theory of Inference” (*Yalishiduode guanyu tuili de luoji lilun* 亚里士多德关于推理的逻辑理论 (1963)) and, in the decades to follow, also his paper “Aristotle on the Law of Contradiction and the Law of Excluded Middle” (*Yalishiduode lun maodunlü he paizhonglü* 亚里士多德论矛盾律和排中律 (1981)). In the 1980s,

the Research Society for the History of Western Logic was established as a new branch of the Chinese Association of Logic. Following its establishment, a series of research treatises and articles on the history of Western logic were published. These included the third part of Wang Xianjun's *Introduction to Mathematical Logic* (*Shuli luoji yinlun* 数理逻辑引论; 1982), which gave a general overview of the developmental history of mathematical logic from Leibniz to Gödel; *Studies in the History of Western Logic* (*Xifang luoji shi yanjiu* 西方逻辑史研究 (1984)) edited by Jiang Tianji 江天骥; *History of Western Logic* (*Xifang luoji shi yanjiu* 西方逻辑史 (1984)), and *A Comparative History of Logic* (*Bijiao luoji shi* 比较逻辑史 (1989)) by Yang Baishun 杨百顺; the government approved textbook for colleges and universities *History of Western Logic* (*Xifang luoji shi* 西方逻辑史 (1985)) edited by Ma Yuke; *Formalization: The Development of Modern Logic* (*Xingshibhua: Xiandai luoji de fazhan* 形式化: 现代逻辑的发展 (1987)) by Zhu Shuilin; *The Development of Modern Logic* (*Xiandai luoji de fazhan* 现代逻辑的发展 (1989)) by Zheng Yuxin 郑毓信; *History of Western Formal Logic* (*Xifang xingshi luoji shi* 西方形式逻辑史 (1991)) by Song Wenjian; *History of Logical Theories in Europe and America* (*Ou-Mei luoji xueshuo shi* 欧美逻辑学说史 (1994)) by Zheng Wenhui 郑文辉; *Aristotle's Syllogistic from the Standpoint of the Modern Formal Logic* (*Yalishiduode de sanduanlun* 亚里士多德的三段论 (1995)) by Jan Łukasiewicz and translated by Li Xiankun 李先焜 and others; *A Life of Reason—Studies in the Thought of Kurt Gödel* (*Lixing de shengming – Gedeer sixiang yanjiu* 理性的生命——哥德尔思想研究 (2000)) by Liu Xiaoli 刘晓力; *Gödel's Program* (*Gedeer gangling* 哥德尔纲领 (2018)) by Hao Zhaokuan 郝兆宽, and *Logical Aspects of Peirce's Philosophy* (*Piershi zhaxue de luoji mianxiang* 皮尔士哲学的逻辑面向 (2012)) by Zhang Liuhua 张留华. However, the great majority of the books published in the earlier period were based on secondhand material, lacking reliability and systematicity. With the start of the 21st century, more attention was given to the thought of Frege, Peirce and Gödel, when a group of younger scholars such as Zhang Liuhua, Liu Jingxian 刘靖贤, Liu Xinwen 刘新文, He Zhaokuan and others published a series of studies of fairly high quality.

Zhang Jialong's long-term engagement in research on the history of Western logic yielded significant contributions to this field. Working with other scholars, he translated two important treatises: *Concise History of Logic* (*Abriss der Geschichte der Logik; Jianming luoji shi* 简明逻辑史 (1977)) by Heinrich Scholz, and *The Development of Logic* (*Luoji xue de fazhan* 逻辑学的发展 (1985)) by William and Martha Kneale, of which the latter is a very detailed and reliable, systematically and carefully written work on the history of logic. Apart from these, Zhang also published numerous studies on the history of logic, including the monograph *Developmental History of Mathematical Logic—From Leibniz to Gödel* (*Shuli luoji fazhan shi*

— *cong Laibunici dao Gedeer* 数理逻辑发展史——从莱布尼茨到哥德尔 (1993)); the edited volume *Intellectual History of Logic* (*Luoji xue sixiang shi* 逻辑学思想史 (2004)); the monograph *Aristotelian Theory of Logic from the Perspective of Modern Logic* (*Cong xiandai luoji de guandian kan Yalishiduode de luoji lilun* 从现代逻辑的观点看亚里士多德的逻辑理论 (2016a)), and the anthology *Discussions on History of Logic* (*Luoji shi lun* 逻辑史论 (2016b)). Among these, the book *Developmental History of Logic* represents China's first comprehensive and systematic treatise on the history of mathematical logic from Leibniz to Gödel. In its opening parts, the book enumerates the methodological principles for research on the history of mathematical logic, dividing its development into four main periods: prehistory, the early stages, foundation and development. The book further expounds on these stages by adopting principles such as integrating logical method and historical method, concluding with illustrating both the external moving forces and internal patterns of the development of mathematical logic, and casting some new light on the dialectical relationship between mathematical logic and social practice. In the discussion on the major results of mathematical logic, particular emphasis was placed on the analysis of logical methods, and, furthermore, on providing a general overview and summary of the philosophical significance of these important results.

Having served as an MA student of Zhou Liquan in early years and under his guidance, Wang Lu engaged in research on Aristotelian logic, which later resulted in his book *Aristotle's Theory of Logic* (*Yalishiduode de luoji xueshuo* 亚里士多德的逻辑学说 (1991)). This volume represents a reliable yet also profound research work. Later, he also translated works like *Collection of Frege's Philosophical Works* (*Fuleige zhexue lunzhu xuanji* 弗雷格哲学论著选辑 (1994)), and Frege's *The Foundations of Arithmetic* (*Die Grundlagen der Arithmetik; Suanshu jichu* 算术基础 (1998)), and published a specialized monograph entitled *Studies in Frege's Thought* (*Fuleige sixiang yanjiu* 弗雷格思想研究 (1996)). Aside from that, he also translated different kinds of classics and research writings on the history of logic, including W. D. Ross' book *Aristotle* (*Yalishiduode* 亚里士多德 (1997)); T. Gilby's *Barbara Celarent—A Description of Scholastic Dialectic* (*Jingyuan bianzhengfa* 经院辩证法 (2000)); Johannes Duns Scotus' *De Primo Principio* (*The First Principle; Diyi yuanli* 第一原理 (2004)), and William of Ockham's *Summa Logicae* (*Sum of Logic; Luoji daquan* 逻辑大全 (2006)).

Sustained Deepening of Research into Inductive Logic

According to the research conducted by Ren Xiaoming 任晓明 and others (Ren, Li, and Cheng 2010), soon after modern inductive logic had been introduced to

China in the 1980s, Chinese research on this underwent a change of its direction from classical to modern inductive logic. A further three major changes of direction at the secondary and primary levels are as follows: a turn from informal research to formal research as well as the synthesis of formal and informal research; a shift from inductive logic of causal relations to probabilistic inductive logic; and a shift from Pascalean probability to non-Pascalean probability.

The key role in advancement of the research on inductive logic in China was played by Jiang Tianji (1915–2006). Its origins can be traced back to 1984, when Jiang delivered a series of lectures on modern inductive logic in Shenyang 沈阳. One year later, in 1985, Jiang published an English article entitled “Scientific Rationality, Formal or Informal?” in *The British Journal for the Philosophy of Science* (Jiang 1985). This was followed by the publication of his Chinese monograph *An Introduction to Inductive Logic* (*Guina luoji daolun* 归纳逻辑导论) in 1987, in which he provided a systematic discussion of modern inductive logic. During the 1990s, Jiang published a further series of Chinese articles on modern inductive logic. Apart from that, he also influenced his colleague Gui Qiquan 桂起权 and served as a doctoral supervisor to a number of future experts (including Zhu Zhifang 朱志方, Chen Xiaoping 陈晓平, Ren Xiaoming, and Pan Tianqun 潘天群). Furthermore, following Jiang’s initiative many colleagues from other Chinese universities also shifted their research to inductive logic, and finally a school of research on inductive logic was formed by those scholars gathering around Jiang.

Another important scholar to have made significant contributions to Chinese research on inductive logic was Wang Yutian 王雨田 (1928–2012). He was in charge of the research team focusing on problems of inductive logic and artificial intelligence in the framework of the National 863 Project, and served as the editor-in-chief of the monographs *Introduction to Inductive Logic* (*Guina luoji daoyin* 归纳逻辑导引 (1992)) and *Inductive Logic and Artificial Intelligence* (*Guina luoji yu rengong zhineng* 归纳逻辑与人工智能 (1995)) that were part of the same project. Furthermore, Ju Shier’s work *Studies in Non-Pascalean Inductive Probabilistic Logic* (*Fei-Basika guina gailü luoji yanjiu* 非巴斯卡归纳概率逻辑研究 (1993)) can also be counted as one of the main accomplishments of Chinese studies on inductive logic. In this book, he systematically analysed G. Shackle’s potential surprise theory and Cohen’s theory of inductive support and grading of inductive probability, establishing his own formal system of non-Pascalean probability—a system of syntax about hypotheses with law-like degree. Other important Chinese treatises on inductive logic include: Deng Shengqing’s 邓生庆 *Inductive Logic: An Evolution from Classical to Modern Form* (*Guina luoji: cong gudian xiang xiandai leixing de yanjin* 归纳逻辑：从古典向现代类型的演进 (1991)); Li Xiaowu’s 李小五 *Modern Inductive Logic and Probabilistic Logic* (*Xiandai guina luoji*

yu gailü luoji 现代归纳逻辑与概率逻辑 (1992)), Ren Xiaoming's *A Comprehensive Exploration into Modern Inductive Logic* (*Dangdai guina luoji tanze* 当代归纳逻辑探赜 (1993)); Chen Xiaoping's *Inductive Logic and Inductive Paradoxes* (*Guina luoji yu guina beilun* 归纳逻辑与归纳悖论, (1994)), and *Bayesian Methods and Scientific Rationality – Reflections on Hume's Problem* (*Beiyesi fangfa yu kexue helixing – dui Xiumo wenti de sikao* 贝叶斯方法与科学合理性——对休谟问题的思考 (2010)); Gui Qichuan and others' *The Logic of Chance and Risk* (*Jiyu yu maoxian de luoji* 机遇与冒险的逻辑 (1995)); Xiong Liwen's 熊立文 *The Development of Modern Inductive Logic* (*Xiandai guina luoji de fazhan* 现代归纳逻辑的发展 (2004)), and Deng Shengqing's and Ren Xiaoming's co-authored *A Century of Inductive Logic* (*Guina luoji bainian licheng* 归纳逻辑百年历程 (2006)).

In his English paper from 1993, Ju Shier demonstrated the insolvability of Hume's problem of induction within the scope of logic, or, in other words, that in logic there is no way to provide neither a positive nor a negative answer to the problem. Outside of the scope of logic, he advanced the concept of local rationality and the method of local justification of induction, attempting to use them to explain how a local justification, rejection or suspension of inductive rationality is possible. Furthermore, he also provided the reconstructive procedure of local induction of scientific research. In a 2001 article, I demonstrated that the background of Hume's problem implicitly contains three unfounded presuppositions: Hume accepted a universal necessary notion of knowledge, having not only looked for deductive necessity but also wanting to explain the necessity of causal relations and universality of empirical knowledge under the confines of sense experience. Since these conditions stand in mutual conflict with each other, this renders Hume's problem essentially logically insoluble. Finally, I also put forward an argument for inductive reasoning based on the concept of practical necessity, proposing a comprehensive program for research on inductive logic (Chen 2001).

Much valuable work on the theory of decision making and game theory was done by Pan Tianqun, Tang Xiaojia 唐晓嘉 and others. Pan Tianqun, for instance, published a series of highly influential treatises on these topics, including: *Introduction to Methodology of Behavioral Science* (*Xingdong kexue fangfalun daolun* 行动科学方法论导论 (1999)); *Living by Game: A Game-Theoretical Reading of Social Phenomena* (*Boyi shengcun – shehui xianxiang de boyilun jiedu* 博弈生存——社会现象的博弈论解读 (2002)); *Studies in Logical Structure of Social Decision-Making* (*Shehui juece de luoji jiegou yanjiu* 社会决策的逻辑结构研究 (2003)); *Game-Theoretical Thinking—Logic Enables You to Make Optimal Decisions* (*Boyi siwei – luoji shi ni juece zhi sheng* 博弈思维——逻辑使你决策致胜; 2005), and *The Way of Cooperation—On the Win-Win Methodology in Game Theory* (*Hexuo zhi dao – boyi zhong de gongying fangfalun* 合作之道——博弈中的共赢方法论 (2010)). In the

last few years, and in cooperation with her doctoral students, Tang Xiaojia has done much high-standard work relating to the logical aspects of game theory and decision making. In a recently published article (Tang 2018), starting from the perspective of the questions “what are the requirements of research in theory of decision making?” and “what can be done with modern logic”, she discusses the multifarious practical value of modern logic in research on decision making theory: it can provide linguistic tools for formally characterizing research on decision making, and defining the algorithms for decision making on the basis of such characterization, describing and demonstrating the strategic capability of the subject, and revealing the difficult problems and predicaments with which we are confronted in the process of decision making, and assisting us in the search for the way to resolve such difficulties. She further urged logicians to engage in research on decision-making theory and join efforts of the related experts to resolve various kinds of challenges that arise in the process of rational decision-making. In this very process, logical knowledge can not only promote the development of decision-making theory, but also promote the establishment of new logical theories and technologies.

The Rise of Research on the Logic of Natural Languages

In the period between the 1960s and the early 1990s, in a community of scholars represented by Wang Fangming, Zhang Zhaomei 张兆梅, Sun Zupei 孙祖培, and others, special attention was devoted to research on the special manifestations and application of traditional formal logic in the Chinese language. Representative research in this regard includes Sun Zupei’s *Essay Writing and Logic* (*Wenzhang yu luoji* 文章与逻辑 (1986)), and Chen Zongming’s reputed work *Logic in Talking and Essay Writing* (*Shuohua xie wenzhang zhong de luoji* 说话写文章中的逻辑 (1989)).

Zhou Liquan (1921–2008) has contributed immensely to Chinese studies on the logic of natural languages (“LNL” for short). In the 1960s, he began to research novel theories such as the speech act theory as advanced by J. L. Austin and J. R. Searle, the theory of conversational implicature by H. P. Grice, as well as other important issues relating to semantics and pragmatics, and thereby introducing the novel wave of research on LNL into Chinese academia. In China, the so-called “logic of natural languages” refers to the logical science which studies the inferences in natural languages through linguistic designation and communication. During the 1960s, Zhou published one article to demonstrate that formal logic ought to investigate the concrete meaning of expressions in natural languages under specific contexts. From the 1980s onwards, he also advocated the view that

research on LNL ought to be conducted on the joint theoretical basis of modern logic, modern linguistics and rhetorics, emphasizing that by using modern logic in the analysis of natural language a new system of logic could be created, whereby the use and scope of logical theory would be expanded and enriched, providing a more effective tool for everyday human thinking and communication. In his 1994 work *Logic—A Theory of Correct Thinking and Successful Communication* (*Luoji – Zhengque siwei he chenggong jiaoji de lilun* 逻辑——正确思维和成功交际的理论), Zhou attempted to implement these positions. This book distinguishes between three different levels of pragmatics: formal, descriptive, and applied. In his opinion, epistemic logic, deontic logic, logic of commands, logic of questions and so on all belong to the category of formal pragmatics. In contrast, concepts such as context, speech act, conversational implicature, presuppositions and rhetoric belong to descriptive pragmatics. Finally, acts like speech, lecturing, debates and their interrelated contents all belong to the domain of applied pragmatics. Furthermore, he also developed the theory of four-level meanings for four different forms of sentences, that is, proposition for abstract sentence, propositional attitude for sentence, significance for discourse, intension (*yisi* 意思) for discourse in a context of communication. Under his direct guidance and influence, there appeared two further generations of young Chinese logicians who also focused their research on LNL.

The first generation of researchers in LNL includes Wang Weixian 王维贤, Li Xiankun and Chen Zongming, whose cooperation resulted in a joint monograph entitled *Introduction to Logic of Language* (*Yuyan luoji yinlun* 语言逻辑引论 (1989)), which represents the first specialized monograph on the topic of LNL in China. Apart from this monumental monograph, each of these scholars also individually authored books on the same topic. Thus, for example, Wang Weixian published *Collected Papers on Linguistics* (*Yuyanxue lunwen ji* 语言学论文集) in 2007; Li Xiankun published *Language, Symbols and Logic* (*Yuyan, fuhao yu luoji* 语言、符号与逻辑) in 2006, and, finally, Chen Zongming published *An Outline of Logic of Chinese Language* (*Hanyu luoji gailun* 汉语逻辑概论) and *Chinese Pragmatic Thought* (*Zhongguo yuyongxue sixiang* 中国语用学思想), in 1993 and 1997, respectively. All the above scholars also made important contributions to dissemination and research on semiotics in China.

The second generation of researchers working on LNL includes Zou Chongli 邹崇理, Cai Shushan 蔡曙山, Huang Huaxin 黄华新, Hu Zehong, Xia Nianxi 夏年喜 and others, of whom Zou Chongli and Cai Shushan were PhD students under Zhou Liquan's supervision. In his research, Zou focuses on the formal semantics of natural languages, such as Montague grammar, categorial grammar, and transformational-generative grammar. He has published three books on LNL:

Logic, Language and Montague Grammar (*Luoji, yuyan he Mengtaige yufa* 逻辑、语言与蒙太格语法 (1995)); *Studies in Logic of Natural Languages* (*Ziran yuyan luoji yanjiu* 自然语言逻辑研究 (2000)), and *Logic, Language and Information* (*Luoji, yuyan he xinxi* 逻辑、语言和信息 (2002)). Cai Shushan's research, on the other hand, is mostly concerned with speech act theory and illocutionary logic, aiming to further develop the work of Austin and Searle, and subsequently establish a formal system of illocutionary logic. He has published two books in LNL: *Speech Acts and Illocutionary Logic* (*Yanyu xingwei he yuyong luoji* 言语行为和语用逻辑 (1998)), and *Language, Logic and Cognition* (*Yuyan, luoji he renzhi* 语言、逻辑和认知 (2007)). Huang Huaxin primary research interests involve topics from cognitive pragmatics, such as pragmatic presuppositions, metaphor, and discourse. He has co-authored several specialized monographs, including *Descriptive Pragmatics* (*Miaoshu yuyongxue* 描述语用学 (2005)); *Formal Analysis of Sentence Meaning in Chinese* (*Hanyu juyi de xingshi fenxi* 汉语句义的形式分析 (2011)); *Introduction to Semiotics* (*Fubaoxue daolun* 符号学导论 (2016)), and *Logic, Language and Cognition* (*Luoji, yuyan yu renzhi* 逻辑、语言与认知 (2017)), and in cooperation with others he has also produced a series of translations, such as E. Steinhart's *The Logic of Metaphor: Analogous Parts of Possible Worlds* (*Yinyu de luoji: Keneng shijie zhi keleibi bufen* 隐喻的逻辑: 可能世界之可类比部分 (2009)), and J. D. McCawley's *Everything that Linguists Have Always Wanted to Know about Logic* (published under the Chinese title *Yuyan de luoji fenxi* 语言的逻辑分析 [Logical Analysis of Language] (2011)), as well as coedited a number of book series on language and cognition.

Finally, the third generation of researchers on LNL are still in the process of formation. Currently, the most prominent among them is Liao Beishui 廖备水, who in his work integrates research on the discourse of natural languages and their logic with artificial intelligence research, taking part in high-level international research cooperation. So far, Liao has published a great number of internationally pioneering research results.

The Import and Flourishing of Philosophical Logic

According to my own detailed examination (cf. Chen 1997), in Western academia philosophical logic came into vogue in the period between the 1930s and 1940s, while in the period since the 1950s up to the present it still represents a vigorously developing and newly ascending group of different branches of logic. It takes mathematical logic (mainly first-order logic) as its direct foundation, while it takes as the objects of its research traditional philosophical concepts and categories on

the one hand, and the application of logic in various concrete sciences on the other. As a research field it thus aims to construct different kinds of logical systems with direct philosophical significance. The group of philosophical logics can be divided into two subgroups: the first is deviant logics, formally manifested as alternative systems of classical logic, including relevance logic, intuitionist logic, free logic, partial logic, logic of counterfactuals, many-valued logics, quantum logic, and fuzzy logic, among others; the second is applied logic, formally manifested as expanded systems of classical logic, such as modal logic, deontic logic, temporal logic, epistemic logic, logic of interrogatives, logic of commands, logic of preference and so on (see also Chen 2013, 13).

Since it is practically impossible to give a comprehensive and precise overview of Chinese studies in such a vast and extensive field in a short study like the present one, here I will try to sketch the whole picture by presenting the work of several representative scholars in the field.

Since the 1980s, a series of introductory works, textbooks, and research treatises on philosophical logic have been published in China. These, for example, include *Introduction to Contemporary Logical Science* (*Xiandai luoji kexue daolun* 现代逻辑科学导论 (vol. 1 and 2, 1987, 1988)) edited by Wang Yutian. This book, which was compiled by a group of younger Chinese scholars under the editorship of Wang, provided a quite complete survey of the current situation of logical research outside China. Similar works also include *The Logical Science Today* (*Jinri luoji kexue* 今日逻辑科学 (1990)) edited by Cui Qintian. Moreover, there are also the following books: Zhou Liquan's *Introduction to Modal Logic* (*Motai luoji yinlun* 模态逻辑引论 (1986)); the Chinese translation of B. F. Chellas' *Introduction to Modal Logic* (*Motai luoji yinlun* 模态逻辑引论 (1989)) produced by Zheng Wenhui and others; Kang Hongkui's 康宏逵 translation of *Logic of Possible Worlds* (*Keneng shijie de luoji* 可能世界的逻辑 (1993)) by Ruth B. Marcus and others; Zhou Beihai's *Introduction to Modal Logic* (*Motai luoji yinlun* 模态逻辑引论 (1997)); Gong Zhaoxiang's 弓肇祥 *General Modal Logic* (*Guangyi motai luoji* 广义模态逻辑 (1993)), and *New Developments in Epistemic Logic* (*Renzhi luoji xin fazhan* 认知逻辑新发展 (2004)); Zhou Zhenxiang's 周祯祥 *Deontic Logic* (*Daoyi luoji* 道义逻辑 (1999)); Li Xiaowu's *Infinitary Logic* (*Wuqiong luoji* 无穷逻辑 (vol. 1 and 2, 1996, 1998)); *Logic of Conditionals* (*Tiaojianju luoji* 条件句逻辑 (2003)); *Lectures on Modal Logic* (*Xiandai luojixue jiangyi – Motai luoji* 现代逻辑学讲义——模态逻辑 (2005)); *Lectures on Logic of Artificial Intelligence* (*Rengong zhineng luoji jiangyi* 人工智能逻辑讲义 (2005)), and *Specific Topics on Dynamic Epistemic Logic* (*Dongtai renzhi luoji zhuan ti* 动态认知逻辑专题; English version published in 2010); Song Wengan's *Logic of Questions* (*Wenti luoji* 问题逻辑 (1998)); Zhou Changle's 周昌乐 *Introduction to Epistemic Logic*

(*Renzhi luoji daolun* 认知逻辑导论 (2001)); Gui Qiquan and others' *Paraconsistent Logic and Artificial Intelligence* (*Cixietiao luoji yu rengong zhineng* 次协调逻辑与人工智能 (2002)); Tang Xiaojia's *Logical Analysis of Cognition* (*Renzhi de luoji fenxi* 认知的逻辑分析 (2003)); Du Guoping's 杜国平 *The Essentials of Classic Logic and Non-Classic Logics* (*Jingdian luoji yu feijingdian luoji jichu* 经典逻辑与非经典逻辑基础 (2006)); and Yu Junwei's 余俊伟 *Studies in Deontic Logic* (*Daoyi luoji yanjiu* 道义逻辑研究 (2005)). Each of these works contributed their share to the spread and development of philosophical logic in China.

Although Zhang Qingyu 张清宇 (1944–2011) maintained a broad knowledge and research interest in philosophical logic, his research mainly focused on paraconsistent logic. His works include *Studies in Philosophical Logic* (*Zhexue luoji yanjiu* 哲学逻辑研究 (1997)) and *Paraconsistent Logic* (*Fuxietiao luoji* 弗协调逻辑 (2003)). The former, which was co-authored with Guo Shiming and Li Xiaowu, offers a relatively systematic and accurate exposition of first-order logic, modal logic, temporal logic, logic of conditionals, many-valued logics, relevance logic, intuitionist logic, paraconsistent logic and Gödel's incompleteness theorems. Zhang obtained a series of significant results in the field of paraconsistent logic.

On the basis of his penetrating analysis of da Costa's system of paraconsistent logic, he constructed systems of paraconsistent logic of conditionals PIW , C_nW , paraconsistent modal logic $C_nG\phi$, paraconsistent logical systems Z_n and Z_nUS , minimal paraconsistent systems of temporal logic with operators G and H , and minimal paraconsistent systems of temporal propositional logic with operators U and S , all of which together expanded the research direction of paraconsistent logic, enriched the theoretical systems of such logics, and thereby advanced Chinese research-level in this particular type of logic (Ju 2013, 153).

In the field of philosophical logic, Feng Mian 冯棉 primarily researched relevance logic, intuitionist logic and modal logic. As a prolific writer, he authored a wide collection of books: *Classic Logic and Intuitionist Logic* (*Jingdian luoji yu zhihui zhuayi luoji* 经典逻辑与直觉主义逻辑 (1989)); *General Modal Logic* (*Guangyi motai luoji* 广义模态逻辑 (1990)); *Relevance and Entailment Logic* (*Xianggan yu yantui luoji* 相干与衍推逻辑 (1993)); *Possible Worlds and Logical Research* (*Keneng shijie yu luoji yanjiu* 可能世界与逻辑研究 (1996)); *Studies in Relevance Logic* (*Xianggan luoji yanjiu* 相干逻辑研究 (2010)); *Structural Inference* (*Jiegou tuili* 结构推理 (2015)), and *Relevance and Entailment Predicate Logic* (*Xianggan yu yantui weici luoji* 相干与衍推谓词逻辑 (2018)), and these works had a significant impact on the spread of and research on philosophical logic in China.

Xu Ming 徐明 mainly undertakes research on temporal logic. Together with Nuel Belnap and others he co-authored the English language book *Facing the Future*:

Agents and Choices in Our Indeterminist World (Oxford University Press, 2001), and has published more than 20 articles in some of the world's leading academic journals, such as *The Journal of Symbolic Logic* and *Journal of Philosophical Logic*.

In 1999, Zhou Beihai published an article in *The Journal of Symbolic Logic*, in which he established a new type of semantic framework for modal logic—grafted frames—proving the completeness of the system of modal logic S1. In 2010, together with Mao Yi 毛翊, Zhou cowrote an article which was published in the internationally acclaimed journal *Synthesis*, and in which the authors provided four semantic layers of common nouns.

Liu Fenrong's 刘奋荣 research mainly involves the logic of rational agency. In her work, Liu has developed several models to explain how information dynamically transforms the preferences of individuals and other agents. In her book *Reasoning about Preference Dynamics* (2011), which was originally written in English as her dissertation at the University of Amsterdam, she developed a new integrated theory using modern information flow and action logic, explaining what exactly preference is and how it changes. She also proposed systems of dynamic logic, which describe the external conditions that act as triggers for the transformation of preference, including new information, suggestions, and commands. Most importantly, this work built new bridges connecting several different scientific disciplines (from philosophy and computer science to economics, linguistics, and psychology), and thus garnered wide influence across the fields. In her current work she focuses on the logical analysis of information flows and decision making within social contexts, where her analysis encompasses both individual subjects as well as social groups. She herself is well recognized by her international colleagues in contemporary logic circles.

Wang Yanjing's 王彦晶 research revolves around epistemic logic. He has published numerous articles on the topic in internationally influential A&HCI journals. In recent years, he proposed and advanced an integrative research project for the field of epistemic logic—the logic of “knowing whether/how/why/what/who”—that would thus surpass the standard epistemic logic of “knowing that” (knowing a single proposition) (cf. Wang 2018).

Gradual Flourishing of the Philosophy of Logic

In the 1980s and 1990s, Susan Haack's book *Philosophy of Logics* (1978) became widely read among the younger generation of Chinese logicians, and thus the philosophy of logic started to become well known in the Chinese circle of logic.

According to my own research, the philosophy of logic aims to reveal the implicit fundamental hypothesis, background assumptions or preconditions underlying general logic or specific logical systems, and to challenge their rationality and investigate the possibilities of alternative choices. There exist at least two different perspectives from which one can approach philosophy of logic: epistemological and ontological (Chen 2013, 17).

Through attentive reading of Haack's *Philosophy of Logics* as well as other works, I established my own understanding of the philosophy of logic, and gradually started conducting independent research in the field. I subsequently authored and published four monographs on this topic: *Elements of Philosophy of Logic* (*Luoji zhaxue yinlun* 逻辑哲学引论 (1990)); *Introduction to Philosophy of Logic* (*Luoji zhaxue daolun* 逻辑哲学导论 (2000)); *Philosophy of Logic* (*Luoji zhaxue* 逻辑哲学 (2005)) as well as *Studies in Philosophy of Logic* (*Luoji zhaxue yanjiu* 逻辑哲学研究 (2013), the expanded edition of my book *Introduction to Philosophy of Logic*). Some of these works reached a broad readership and became widely used as textbooks at Chinese universities. In addition to these titles, my book *Studies on Paradoxes* (*Beilun yanjiu* 悖论研究 (2014)) presented an exhaustive investigation of paradoxes, providing a relatively in-depth research of a wide array of different paradoxes. Since 2007 I have authored more than 20 English articles which were published in different international A&HCI journals, the majority of which were devoted to the philosophy of logic.

In his book *The Conception of Logic* (*Luoji de guannian* 逻辑的观念 (2000)), Wang Lu posits that logic exclusively describes a science investigating the relation of “necessary follow” of conclusions from certain premises, while other types of so-called “logic”, for instance “inductive logic” or “dialectical logic”, are not at all true logics, because their focus does not reside with the relation of “necessary follow”. The book initiated to a wide-ranging and intense polemic regarding the following questions: What is logic? How should we investigate logic? Was there in ancient China such a thing as logic? How should we approach the history of Chinese logic? How should we study Western philosophy? Wang wrote another book entitled *Being and Truth: The Cornerstones of Metaphysics* (*Shi yu zhen: xing er shang xue de jishi* 是与真：形而上学的基石 (2003)), which explores the philosophical significance of “to be” and “truth” as well as their corresponding terms in Chinese, which also gave rise to fierce debates in the fields of logic and philosophy.

Zhang Jianjun was the first Chinese scholar to have systematically studied logical paradoxes, whose principal interest resides in mathematical and semantic paradoxes. He has published several different book about paradoxes, of which the most influential is his *Introduction to Studies on Logical Paradoxes* (*Luoji beilun yanjiu*

yinlun 逻辑悖论研究引论; first published in 2002, a revised edition published in 2014). In this book, he discusses the constituents and classifications of paradoxes, as well as the origins and characteristics of different paradoxes. Additionally, he has also conducted comparative research of different kinds of solutions for paradoxes, exploring the standards of correctly eliminating paradoxes, and at the same time distinguishing between different hierarchies of researching paradoxes and their mutual interactions. He has also edited the collective monograph *Studies in Frontier Problems in Contemporary Philosophy of Logic* (*Dangdai luoji zhaxue qianyan wenti yanjiu* 当代逻辑哲学前沿问题研究 (2014)), which clarifies and evaluates the advances in the Western philosophy of logic since the 1970s.

In their co-authored book *Genetic Research of Non-Classic Systems of Logic* (*Fei-jingdian luoji xitong fashengxue yanjiu* 非经典逻辑系统发生学研究 (2011)) Ren Xiaoming and Gui Qiquan carried out a genealogical investigation of non-classical logical systems, such as modal logic, intensional logic, deontic logic, the logic of indicative conditionals, inductive probability logic, fuzzy logic, quantum logic, many-valued logics, paraconsistent logic, formalized dialectical logic and the logic of argumentation. From their investigation, they drew the following conclusions: the central question of the philosophy of logic is the question of an exact match between the concepts of system-relative and extra-systematic validity of inference. As they emphatically noted:

... in contrast to the academic world of philosophy of science, where a climate of fallibilism has already taken the upper hand, in the current Chinese circle of logicians the influence of epistemic inerrancy is still standing strong. It is highly probable that this has turned into a great intellectual impediment for Chinese logic's "reform and opening up"! Its reform ought to be done with greater courage and at a more rapid pace! A new practice would inevitably open up new ground for logic and help it to rapidly overcome the old delimiting norms. People must in no way stop marching onwards on hearing the warning "not logic". To make innovations in logic scholars must be adept at turning the philosophy of logic into a weapon, encouraging the departure from various kinds of classic systems and bring about a contest between oppositions, to finally pave the way for the emergence of new non-classic logics! (Ren and Gui 2011, 222)

Focusing on theories of truth, free logic, and their philosophical characteristics, Hu Zehong composed two books on the philosophy of logic: *Rethinking Philosophy of Logic* (*Luoji de zhaxue fansi* 逻辑的哲学反思 (2004)) and *Studies in Philosophy of Logic* (*Luoji zhaxue yanjiu* 逻辑哲学研究; Hu et al., 2014). The work *Studies*

maintains that the philosophy of logic is a scientific discipline which studies logic, in particular modern logic and the philosophical questions of its development. The book consists of an introduction and the following nine chapters: “The Scope and Characteristics of Logic”; “Logic, Language, and Existence”; “Truth and the Theories of Truth” (two chapters); “Meaning and Reference”; “Modal Logic and its Philosophical Questions” (three chapters); and “Free Logic and its Philosophical Questions”. The first five chapters represent a comprehensive philosophical investigation of logic, with a particular focus on modern logic, whereas the last four chapters select two concrete branches of modern logic, namely modal logic and free logic, presenting a relatively in-depth investigation of their inherent philosophical questions.

In the recent years, Li Na 李娜 and her PhD students have conducted systematic research on axiomatic theories of truth, which covered classical axiomatic theories of truth, as well as axiomatic theories of truth based on intuitionism and set theory. Collectively, they have published several quite high-quality papers, and their achievements of the project supported by the National Social Science Fund were evaluated as “excellent”.

Xiong Ming’s 熊明 research focuses mainly on truth theory and liar-type paradoxes, on which he published a book entitled *Arithmetic, Truth, and Paradoxes* (*Suanshu, zhen yu beilun* 算术、真与悖论 (2017)). He developed a new truth schema—a relativized T-schema—the procedure of which is to expand Tarski’s T-schema (‘A is true if and only if A’) onto a relational framework. Or, in other words, speaking about arbitrary possible worlds u and v within the same framework, if u is accessible to v , then it is possible to establish the truth of A in u , if and only if A can be established in v . By virtue of this new kind of T-schema, Xiong was able to obtain a series of new results relating to the problem of liar-type paradoxes, which were for the most part published in important international A&HCI journals.

The Introduction of Informal Logic and Critical Thinking

Informal logic and critical thinking, two mutually highly overlapping concepts, were introduced to China in the 1990s. As the current editors-in-chief of the journal *Informal Logic*, Ralph Johnson and Anthony Blair, pointed out: informal logic is “a branch of logic whose task is to develop non-formal standards, criteria, procedures for the analysis, interpretation, evaluation, criticism and construction of argumentation” (Johnson and Blair 1977, 147). According to my own research, “critical thinking” has got the following four important meanings: a reformist movement in education which originated in the United States and grew to popularity in Europe; it

is an intellectual trait, orientation, and habit which must be possessed by a qualified citizen and an innovative talent in today's society; a string of reflective capacities, methods and strategies which must be adopted for making rational decisions about what we should believe or how we should act; a curriculum which aims at fostering the disposition, habit and ability of critical thinking (Chen 2017, 22).

After the year 2000, specialized treatises and textbooks on informal logic, and especially English works on critical thinking, underwent large-scale translation into Chinese. Some of these books were even translated more than once. In parallel to the translated works, Chinese scholars also published many introductory articles on informal logic and critical thinking, and subsequently some textbooks on the same subjects. The most noteworthy among these works are: Wu Hongzhi's 武宏志 and Zhou Jianwu's 周建武 *Critical Thinking: from the Perspective of Argumentation Logic* (*Pipanxing siwei: lunzheng luoji shijiao* 批判性思维：论证逻辑视角; first edition 2005, second edition 2010, third edition 2016); Liu Zhuanghu's 刘壮虎 and Gu Zhenyi's 谷振诣 *A Coursebook in Critical Thinking* (*Pipanxing siwei jiaocheng* 批判性思维教程 (2006)); Yang Wujin's 杨武金 *Logic and Critical Thinking* (*Luoji yu pipanxing siwei* 逻辑与批判性思维 (2009)); Dong Yu's 董毓 *Principles and Methods of Critical Thinking* (*Pipanxing siwei de yuanli he fangfa* 批判性思维的原理和方法 (2010)), and Chen Muze's 陈慕泽 and Yu Junwei's *Logic and Critical Thinking* (*Luoji yu pipanxing siwei* 逻辑与批判性思维 (2011)). In my judgment, Liu Zhuanghu's and Gu Zhenyi's *Coursebook* and Dong Yu's *Principles and Methods* are much better than the rest of these textbooks. In the same period, critical thinking courses also started to be offered at Chinese universities. It should be mentioned that Wu Hongzhi made significant contributions to the dissemination of and research on informal logic and critical thinking in China. He authored quite many articles on critical thinking and composed or co-authored several textbooks, while at Yan'an University he founded the 21st Century New Logic Research Institute in 2008. In his work *Schemes of Argumentation* (*Lunzheng xingshi* 论证型式 (2013)) he provides a systematic introduction to as well as independent research on argumentation schemes. Last but not least, in the last few decades, Xiong Minghui 熊明辉, Xie Yun 谢耘 and other Chinese researchers have managed to publish articles on informal logic, critical thinking and theory of discourse in leading international SSCI and A&HCI journals.

Transformations in Research on Legal Logic

Chinese studies on legal logic started in the 1980s, when the first set of related textbooks were published in China. At this early stage, however, the label "legal

logic” (*falü luoji* 法律逻辑) described nothing new except adding examples of the principles of traditional logic from law and judicial practice. It was only after the year 2000 that a few Western works on legal inference and proof were translated into Chinese, and that a certain group of Chinese legal scientists started taking part in research on legal logic. Subsequently, using different kinds of resources or instruments—such as traditional formal logic, mathematical logic, informal logic, critical thinking, discourse theory, theory of legal inference and proof, legal science and legal philosophy—Chinese scholars started researching logical problems of law, judicial investigation and judicial trials and so on, and in turn developed an independent theory of legal logic. In the words of Lei Lei 雷磊:

Legal logic has its application in legal epistemology, especially in theories about application of law. Legal logic represents an integral part of legal argumentation theory, it is applicable in the justification aspects but not discovery ones of law. The centre of its research resides in structural theory of legal norms and mode theory of legal argumentation. While the theory of norms studies the types of norms and the construction of normative systems, on the other hand, the theory of legal argumentation focuses on the elementary modes of legal debates. These, however, only constitute the object theories of legal logic, while the latter still requires a form of metatheory, which concerns with three main problems: Are norms the object of logical research? Is there any need for a special kind of logic about norms? Would this kind of logic about norms be equipped with special logical laws? Furthermore, legal logic is faced with the limitations from two aspects, namely whether it recognizes law as a science, as well as the possibility that legal logic itself might implicitly contain limitations of its domain or its perspective. Hence, legal logic must take legalization (*falühua* 法律化) and formalization as the two main directions in the future. (Lei 2017, 188)

Recent Chinese research on legal logic includes the following publications: Wang Hong’s 王洪 *Legal Logic* (*Falü luojixue* 法律逻辑学; first edition 2001, second edition 2016) and *Reasoning in Statutory Law and Case Law* (*Zhidingfa tuili yu panlifa tuili* 制定法推理与判例法推理; first edition 2013, second edition 2016), Zhang Jicheng’s 张继成 *Practical Coursebook in Legal Logic* (*Shiyong falü luoji jiaocheng* 实用法律逻辑教程 (2004)); Zhang Baosheng’s 张保生 *Theories and Methods of Legal Reasoning* (*Falü tuili de lilun yu fangfa* 法律推理的理论与方法 (2000)); Xie Xingquan’s 谢兴权 *The Path to Justice—Studies in Methodology of Legal Reasoning* (*Tongxiang zhengyi zhibilu – falü tuili de fangfalun yanjiu* 通向正义之路——法律推理的方法论研究 (2000)); Chen Rui’s 陈锐 *Theory of Legal*

Reasoning (Falü tuililun 法律推理论 (2006)); Luo Shiguo's 罗仕国 Science and Values: Introduction to Legal Reasoning as Practical Reason (Kexue yu jiazhi: zuowei shijian lixing de falü tuili daolun 科学与价值：作为实践理性的法律推理导论 (2006)), and Xiong Minghui's Lawsuit Argumentation—A Logical Analysis of Lawsuit Contest (Susong lunzheng – susong boyi de luoji fenxi 诉讼论证——诉讼博弈的逻辑分析 (2010)), etc.

The Successive Establishment of Institutions for Logical Research

Before 1978, Chinese universities had no research institutes specialized in logic. From the 1990s onwards, however, quite a few new research institutes for logic were established in quick succession at Chinese universities, such as the Institute of Logic and Cognition at Sun Yat-sen University (“ILC” for short) (Zhongshan daxue luoji yu renzhi yanjiusuo 中山大学逻辑与认知研究所, est. 1997); Institute of Logic at China University of Political Science and Law (Zhongguo zhengfa daxue luoji yanjiusuo 中国政法大学逻辑研究所, est. 2002); Institute of Modern Logic and Applied Logic at Nanjing University (Nanjing daxue xiandai luoji he yingyong luoji yanjiusuo 南京大学现代逻辑与逻辑应用研究所, est. 2003); Centre for Logic, Language, and Cognition at Peking University (Beijing daxue luoji, yuyan yu renzhi yanjiu zhongxin 北京大学逻辑、语言与认知研究中心, est. 2004); Research Centre for Logic and Intelligence at Southwest University (Xinan daxue luoji yu zhineng yanjiu zhongxin 西南大学逻辑与智能研究中心, est. 2004); Research Centre for Logic and Cognitive Science at Beijing Normal University (Beijing shifan daxue luoji yu renzhi kexue yanjiu zhongxin 北京师范大学逻辑与认知科学研究中心; 2005); Research Centre for Language and Cognition at Zhejiang University (“CSLC” for short) (Zhejiang daxue yuyan yu renzhi yanjiu zhongxin 浙江大学语言与认知研究中心, est. 2007); Research Institute for Modern Logic and Philosophy of Science and Technology at Renmin University of China (Zhongguo Renmin daxue xiandai luoji yu kexue jishu zhexue yanjiusuo 中国人民大学现代逻辑与科学技术哲学研究所, est. 2007), and Tsinghua University—University of Amsterdam Joint Research Centre for Logic (“JRC” for short) (Qinghua daxue – Amusitedan daxue luojixue lianhe yanjiu zhongxin 清华大学-阿姆斯特丹大学逻辑学联合研究中心, est. 2013). After their establishment, these research institutes all underwent favourable development. Currently, the most excellences of these institutions include ILC, JRC and CSLC: all of them have extensive and high-level international communication and cooperation, and are undergoing a transformation from a pure “follower” to sort of “leaders” in the international trends of logical research. (For more details see Chen 2018)

Chinese Logicians Start Entering the International Academic Arena

In the period between the 1950s and 1980s, the Chinese circle of logicians were in a state of almost complete isolation from the West, as a consequence of which there was a general lack of understanding of the situation in the field of logic outside China. At the same time, only an extremely small number of Chinese logicians managed to publish their research results in European and American logical, mathematical or philosophical journals. Due to the last four decades of reforms and opening up to the world, the state of Chinese logic has undergone a radical change compared to its state prior to 1978. At present, Chinese logicians are having substantial contacts with their international colleagues, at the same time many scholars have gained at least a year's experience of visiting or studying abroad, while some of them even earned their PhD degrees from foreign universities. Moreover, many Chinese logicians can now take part in or even preside over international academic conferences or workshops, and publish their articles in SCI, SSCI and A&HCI journals specialized in logic and philosophy, and or their monographs with English publishing houses. The most prominent among these scholars include myself, Zhao Xishun, Ye Feng 叶峰, Liu Fenrong, Xiong Wei 熊卫, Liao Beishui, Cheng Yong 程勇, Ma Minghui 马明辉, and Wang Yanjing. I was even elected as a titular member of Institut International de Philosophie (Paris) (IIP) in 2018, and of Académie Internationale de Philosophie des Sciences (Bruxelles) (AIPS) in 2021. Apart from these scholars, the following should also be noted in this context: Ju Shier, Huang Huaxin, Zhou Beihai, Liu Hu 刘虎, Wang Wei 王玮, Wen Xuefeng 文学锋, Xiong Minghui, Xie Yun, Pan Tianqun, Xu Cihua 徐慈华, Ju Fengkui 琚凤魁, Zhang Lifeng 张力锋, and others. Such successes are the most persuasive sign of the rise in standards in Chinese logical research (for more details see Chen 2018).

Conclusion: Experiences and Lessons

Looking back at the past seven decades, we can feel quite a few regrets. Although, sharing its path with our republic, Chinese academic logic has walked a winding road, gaining an incredibly complex set of experiences, but it has still been able to embrace its ideals and, under the burden of its long-term mission, demonstrated unyielding initiative and tenaciousness. Due to such long-term efforts, Chinese academic logic was ultimately able to overcome its obstacles and thread down its great path forward, forging ahead towards development and prosperity. After careful reflection on past experience, I can provide at least four lessons which

ought to serve as guidance for the future development of Chinese logic, or put more broadly, Chinese academics:

1. Let politics and academia each manage their appointed domains, thereby truly respecting and sustaining academic freedom

In the three decades between 1949 and 1979, the main reason for the comparatively slow development of Chinese logic resided in the meddling of political powers. In the ROC period, owing to the efforts of Jin Yuelin and others, the newly emerging discipline of mathematical logic already reached a certain level of dissemination in China, having also educated a generation of new talent. In this period, some young scholars who earned their doctorates at European and American universities also had the opportunity to lead Chinese logic to the frontiers of modern science. Then, after the Revolution, and due to the intertwining of many different factors, the PRC regarded the Soviet Union as its “big brother”, and engaged in unconditional learning from and emulation of the Soviets in all aspects and levels, to the degree that even logic as a completely non-ideological science was not exempt from this wholesale Sovietization. Thus, because in the Soviet Union mathematical logic was subjected to a long period of criticism and rejection, China also followed suit, criticizing and rejecting it as well, which ultimately resulted in a great delay in the development of mathematical logic in China. In addition to this, under the influence of Soviet ideology even traditional formal logic became equated with idealism and metaphysics (in contrast to dialectics), with the intention to eliminate its theoretical foothold. Fortunately, it was also due to political intervention that, under Mao Zedong’s guidance, the great debates on logic happened in the 1950s and 1960s. These debates caused formal logic to regain its legitimacy and enabled its survival. Similarly, it was also Mao’s support which led to two major waves of popularization of logic in China. As such, it is indeed the case that both the success and failures of logic in China were both due to the same cause.

In reality, the fundamental principles of dealing with the relationship between academia and politics ought to be let academia be taken care of by the academics and politics by politicians, they must not arbitrarily overstep their boundaries, and this will give rise to the peaceful coexistence of both sides. The criterion for clear partition of their territories is the national constitution: scholars are also citizens, and thus are obliged to abide by the constitution, while opinions against the constitution ought to be subjected to censorship and acts against the constitution to legal sanction. But, on the other hand, for any opinion and action, as long as it does not violate the constitution and its stipulated civil rights and stays within the category of speech, it belongs to the scope of civil liberties and academic

freedom, into which no authority has the right to interfere. Even a poor person with his simple and poor abode has the courage to announce: The wind can enter, the rain can enter, but the king of the realm cannot. Our historical experiences have repeatedly made clear that respecting, protecting and supporting academic freedom is the fundamental precondition for preventing errors, discovering truth, and creating academic prosperity.

2. Science cannot advance in isolation from the international academic community; it needs to warmly embrace the community and, at the same time, insist on independent thinking

Academia is essentially a public undertaking, the commonality of which can be conveyed with one word: *sharing*. First of all, through engaging in sharing their works with other members of academic community, a scholar is therefore able to get challenged, gain enlightenment, carry out consultations with their colleagues, and thereby enliven their own thought. Only by being able to stand on the shoulders of giants can a scholar gain a broader perspective and attain more outstanding ideas. Secondly, by sharing their own research results with other scholars, and thereupon receiving the feedback, criticism or challenges, a scholar can advance, deepen and develop their own theories or viewpoints, or inspire other members of the academic community to do the same. The smaller an academic community is, the greater the probability that it will get enshrouded in kind of bias. In contrast, the greater the community, the smaller the chance that it will be controlled by such bias. Again, a scholar only qualifies as an independent member of the academic community if they arrive at their own distinct viewpoints about a certain problem by means of independent reflection. Such a scholar also learns from and exchanges their views with other members of the community, and in that way also makes their own contribution to that community. If a scholar abandons independent thinking and conforms to the views of the majority, having no independent views or theories of their own, this will lead to the following outcome: if other people are between 1 and 9, such scholar will amount only to 0, having no special value of their own, but instead, through attaching themselves to the rears of the others, he highlights the significance and value of other scholars. The process of Chinese academic logic in the last seven decades serves as yet another example to corroborate all this. When Chinese logic was isolated from the rest of the world, its conditions was appropriately bad, while, on the other hand, when the country opened its doors and Chinese logic was able to embrace the world beyond, its potential also came to life, enabling it to attain development and prosperity. In the years to come, we must always remember this valuable lesson.

3. The promulgation of the “let a hundred flowers bloom and a hundred schools of thought contend” policy enabled different academic views to attain improvement and advancement through mutual collision

An immense advantage of the Hundred Flowers campaign was to offer other possibilities, revealing alternative prospects, which had a corrective function for already existing ideas and learning. However, it seems that in the end only one branch was able to thrive, one single flower could bloom, and only one school of thought was allowed to dominate, thus what the campaign often produced was academic monotony, obstinate, bogged down or even characterized by complete academic stasis. Even if, following Deng Xiaoping’s reforms, a certain group of my Chinese peers once wanted to achieve the dominance of mathematical logic in the Chinese circle of logic, to the extent that they even wanted to freeze logic up to the level of mathematical logic, in particular to the level of the first-order logic, the reality soon turned the course of things into another direction. Stemming from several kinds of considerations and, above all, the practical demands of this era, Western logic ultimately treated the already extant mathematical logic as a mere method and instrument, while instead its main developmental focus shifted to advancing new deviant logics and expanded logics on the one hand, and developing new theories in philosophy of logic on the other. Moreover, this development even led to the advancement of informal logic and critical thinking as theoretical complements for the flaws and shortcomings of mathematical logic. Chinese logicians must always keep in mind this important lesson from the past, and always adhere to the policy of “let a hundred flowers bloom and a hundred schools of thought contend”, letting different academic views adequately compete against each other, and thereby enabling their unceasing progress and improvement.

4. Gradually fostering academic self-confidence, to advance from follow-up learning to leading in innovation

Because of China’s stagnation and backwardness in the early modern era, in its contacts with the external world and especially with Western countries, we actively or passively played a role of a student or follower: while others were developing science and technology, we were merely learning from their science and technology; while others were doing research in philosophy, we were merely researching others’ philosophy; while others had discovered or invented logic, we were merely studying and researching the logic from them. Although, in the past this stage of learning was necessary, it now needs not only to be surpassed but we now already possess the capacity to advance to the next stage: if others are researching X, we must study how the others research that X. Moreover, we should also join the others in their research of that X, and produce the Chinese people’s own contributions to the research. Under the leadership of Ren Zhengfei 任正非, the Huawei company works

exactly in this manner. It developed and expanded its own strengths, and therefore garnered great respect and met many challenges. Chinese logic ought to follow the same pattern as Huawei's, by gradually making the change from follow-up learning to leading. In the creative domain of logic, Chinese logicians must also make their own significant contributions, and we hope this day will arrive soon!

Acknowledgement

This article is supported by the research project 'Studies on the Significant Frontier Issues of Contemporary Philosophy of Logic' (Grant number: 17ZDA024) funded by the National Social Science Fund (China).

English translation by Jan Vrbovski.

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