Logic Teaching in China: Past and Present

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1 Introduction

At the beginning of the 20th century, the final dynasty of China, Qing Dynasty, was declining. Having to accept one defeat after another in the military fields, the Chinese intellectuals were struggling to find a way to save their beloved county. Learning advanced science and technology from the West became a natural way to go. Many students were sent abroad to study. A large number of books, including logic books, were translated into Chinese. For instance, the Chinese version of Mill's *A System of Logic, Ratiocinative and Inductive* appeared in 1905, Jevons' *Elementary Lessons on Logic* was translated in 1907. Bertrand Russell visited Beijing in 1920 and gave a lecture series on mathematical logic, though what intrigued him most was politics at that moment in China. All this was a prelude of a full-scale introduction and development of logic in China in the 20th century.

The aim of this short paper is to investigate the dissemination of logic in China, especially, through logic teaching for undergraduate students in philosophical institutions of Chinese universities. In particular, we study a few concrete textbooks which were popular and influential in the history. We will compare them, and analyze them from a historical point of view. This will provide us a better understanding of the current situation in logic teaching in China, the main issue of the final part of the paper.

2 New Light in the 1930s: Jin Yuelin and his Textbook

Jin Yuelin, the founding father of the Department of Philosophy at Tsinghua University, received his Ph.D in politics in Columbia University in 1920, but got very interested in logic in the following year during his visit to the UK, Germany and France. He was influenced greatly by Russell's works. From 1925, he started teaching logic at Tsinghua University. From 1932 he started a course called "symbolic logic" at Peking University, too. His lecture notes *Logic* were published in 1935 at Tsinghua University Press. The book was received so well by the audience that it was re-printed in 1936 at the Commercial Press and

listed in the University Book Series. The book *Logic* consists of the following four parts:

Part I:	Traditional Deductive Logic
Part II:	Criticism of Traditional Logic
Part III:	First Order Logic
Part IV:	Meta-logical Discussions

Based on a systematic criticism of traditional logic, Jin proposed that we should study the newly developed logic, i.e. first order logic. He admitted explicitly in the Preface that the content of Part III was mostly copied from the book *Principia Mathematica*. In that part he introduced propositional calculus and predicate calculus, but also calculus of classes and of relations. The book listed proofs for 67 theorems in detail in propositional calculus, some of them were new, found by the author. From time to time, he also gave his intuitive interpretation for some theorems. The final part of the book were mainly philosophical discussions, with which the author expected the readers to continue after they had learnt Part III.

Jin was one of the pioneers who started teaching modern logic in China. Influenced by him, his students Shen Youding (graduated in 1929 at Tsinghua Uni.), Wang Xianjun (graduated in 1936 at Peking Uni.), Hu Shihua (graduated in 1936 at Peking Uni.) and Wang Hao (graduated in 1945 at Tsinghua Uni.) went abroad to study mathematical logic. They became the main force later on in the history to carry on logic teaching and logic research both in China and internationally. For a review on their contributions in research, we refer to [5].

3 Stagnation Period (1950s-1970s)

After the socialistic People's Republic of China was founded in 1949, Chinese followed the Soviet Union in every aspect. Russian textbooks in logic were translated into Chinese, and used to educate the Chinese young students and logicians. The following table may give our readers some impression how that trend was taken in China. It shows that several different Chinese versions of the book *Logic* by S.N. Vinogradov and A.F. Kuzmin appeared almost at the same time.

Translator	*Publisher*	*Year*
Qi Dayan	Chung Hwa Book Co.	1950
Liu Zhizhi	Joint Publishing	1951
Liu Zhizhi	People's Education Press	1955
Gao Jingqi	Zhengfeng Press	1951
Fang Dehou	Author House	1953

This book and other Russian textbooks that were translated in that period mainly talked about traditional logic, plus something on Mill's classic works on induction, and discussions on a few other issues. To illustrate, here is the structure of the above book:

Chapter 1	Definition and Aim of Logic
Chapter 2	Methods of Logic
Chapter 3	Concepts
Chapter 4	Definition and Division of Concepts
Chapter 5	Judgement
Chapter 6	Transformation of Judgement
Chapter 7	The Basic Laws of Logical Thinking
Chapter 8	Deductive Inference
Chapter 9	Inductive Inference
Chapter 10	Analogy
Chapter 11	Assumption
Chapter 12	Augmentation and Refutation

Those translated books set a very bad example in China. Little about the new development of mathematical logics was included in those books. In a sense, they were very out-dated. But both their structure and content were followed unexceptionally by the Chinese logic textbooks that appeared in the 1950s, 1960s and 1970s. Those books that have more or less the same structure have been called *General Logic* (Putong Luoji) in China. To see this, here is the set-up of the book *Formal Logic* edited by the logic group of Renmin University in 1959.

Chapter 1	Introduction
Chapter 2	Concepts
Chapter 3	Judgement
Chapter 4	Laws of Logical Form
Chapter 5	Inference, Direct Inference
Chapter 6	Categorical Syllogism
Chapter 7	Hypothetical and Disjunctive Syllogism
Chapter 8	Inductive Inference
Chapter 9	Analogy and Assumption
Chapter 10	Proofs

However those books were widely adopted in logic teaching in Chinese Universities. Students were fed with those old materials, losing their view on what was happening then worldwide. [3] On the other hand, mathematical logic was in a rather neutral status in the 1950s and early 1960s, it was neither encouraged, nor forbidden. Some logicians who had been educated aboard continued

[3] This period produced many Chinese logicians who are enthusiastic about dialectic logics.

their teaching and research in mathematical logic in China. For instance, both Wang Xianjun and Hu Shihua taught mathematical logic in the Beijing area. Many more young logicians were attracted to logic studies. This turned out to be extremely important for the later development of logic.

The Chinese history followed is known by the world: during the ten years of the Cultural Revolution (1966-1976), there was hardly any progress in logic teaching or research. The academic journals that used to publish research papers only accepted political articles, the platform on their university campus became a place to humiliate the intellectuals.

When the Cultural Revolution was over, the society gradually returned to normal, and Chinese logic community started moving again. The First National Logic Conference was initiated and organized by the Institute of Philosophy of the Chinese Academy of Social Sciences in 1978. At that conference, Hu Shihua, Wang Xianjun and Mo Shaokui were invited to speak on mathematic logic. Also, Zhang Jialong presented a paper "Formal logic to be modernized", arguing that the textbooks being used for teaching were problematic, and he suggested that we should write new modernized formal logic textbooks. At the Second National Logic Conference in 1979, Wang Xianjun explicitly claimed that it was the General Logic course that needed to be reformed and modernized. From then on "modernization" became a slogan which has guided the logic teaching and research in China till today. We will discuss what has happened to logic teaching in more detail in the next section.

4 Modernization: from 1978 till Today

4.1 Reform: Absorbtion vs. Replacement

Then, how to modernize? This issue has been controversial from the start. There are about 570 Chinese articles from 1978 to 2010 discussing this topic. Here are some recent ones: [2], [3], [6], [4] and [1]. To summarize, there are two dominant views. Some logicians think we should keep the structure of the General Logic, but absorb as much mathematical logic as possible. The main reason is that traditional logic is closer to real life and seems more useful for training students. This view is called "Theory of Absorbtion". Differently, people who hold a more radical view think that we should replace *General Logic* with mathematical logic, as every problem that traditional logic can handle can be dealt with by mathematical logic, moreover, there are many problems that traditional logic cannot handle, while mathematical logic can. This is called "Theory of Replacement". The difference between these two views is reflected in the textbooks that appeared since then.

The first book we would like to look at is *Principles of Formal Logic* ([7]). It was edited by six logicians at the Institute of Philosophy, Chinese Academy of Social Sciences. It was generally considered to be the first book that broke the structure of Russian logic textbook and introduced more mathematical logic. Here is its set-up:

Chapter 1	Introduction
Chapter 2	Concepts
Chapter 3	Propositions
Chapter 4	Deductive Inference
Chapter 5	Deductive Inference (continued)
Section 5.1	Propositional Logic
Section 5.2	Predicate Logic
Chapter 6	Inductive Methods
Chapter 7	Basic Laws of Formal Logic
Chapter 8	Argumentation

Though the structure looks still quite similar to those Russian ones, careful reading tells the story. First, the notions and notations of mathematical logics were adopted throughout the book. For instance, set and operations on sets were used to explain the extension of concepts. In Chapter 4 and 5, the book first introduced inference forms and rules in traditional logic, and showed that traditional logic can be used to analyze simple inferences, but it is not adequate for complex inferences. For that reason a more expressive logic is called for. Accordingly, Chapter 5 naturally introduced propositional logic and predicate logic, with many discussions on quantifiers.

This book has set up a first model on how and what to introduce from mathematical logic to General Logic book. Many its ideas were accepted by other books which took the "Theory of Absorbtion" as their principle.

In fact, the "Absorbtion" view is vividly represented in the subsequent three editions of the book *General Logic* which was edited jointly by 11 Chinese universities and first published in 1979.

- Starting from the 2nd edition of the book, many formal symbols were adopted from mathematical logic to express inference with complex propositions.
- In the 3rd edition that appeared in 1986, the book introduced basics of set theory in the chapter on Concepts, the method of truth tables in the chapter of Judgement, and Venn's diagram in explaining syllogisms.
- In the 4th edition that appeared in 1993, even more dramatic changes took place: dialectic logic related content was deleted from the book, two new chapters on propositional natural deduction and predicate natural deduction, respectively, were added.

By 2010, this book has had four editions, have been printed for 53 times, and issued 2,205,600 copies. The 5th edition of the book will soon appear in 2011. One can see its influence from those figures.[4]

The 1980s witnessed many logic textbooks in the same spirit. Most of them has reformed to some extent, formal proof of propositional logic and predicate logic were added. The structure of the books also had some changes.

On the other hand, logicians who hold the view of "Replacement" wrote textbooks too. Here are some selected ones.

- Wang Xianjun, *Introduction to Mathematical Logic (shuyi luoji yinlun)*, Peking University Press,1982.
  Content: propositional logic (modal logic and many-valued logic were introduced briefly at the end), predicate logic, and a brief history of mathematical logic.
- Zhang Shangshui, *Introduction to Mathematical Logic (shuli luoji daoyin*, Chinese Social Science Press, 1990.
  Content: propositional logic (Hilbert system), predicate logic (Hilbert system. Basics of model theory was introduced at the end)
- Liu Zhuanghu, *Logical Calculus (luoji yansuan)*, Chinese Social Science Press, 1993
  Content: propositional logic (Hilbert system), predicate logic (Hilbert system), natural deductive system, non-classic logic (mainly intuitionist logic)
- Son Wengan, *Basis of Symbolic Logic (fuhao luoji jichu)*, Beijing Normal University Press 1993
  Content: propositional logic, predicate logic.
- Xu Ming, *Lecture Notes on Symbolic Logic (fuhao luoji jiangyi)*, Wuhan University, 2008
  Content: propositional logic (both natural deduction and Hilbert system), predicate logic (both natural deduction and Hilbert system), appendix(tableaux, modal logic, mathematical induction)

Here the situation is clearer: almost all these books focused on two calculi: propositional calculus and predicate calculus, and explained them in great detail. Hilbert axiomatization, as well as natural deduction was often adopted.

4.2 Real Situation: Compromise?

However, the reality is more complex, choice of textbooks often depends on the curriculum, or teachers' view of logic. For instance, for those universities

[4] Thanks to Professor Wu Jiaguo of Beijing Normal University for kindly providing these numbers.

where there is only one logic course for undergraduate students in philosophy, the above mathematical logic books are rarely used as textbook. Instead, textbooks are mostly a mixture of modern logics and traditional logic. The following ones are of this kind.

- Song Wenjian, *New Logic Textbook (xin luoji jiaocheng)*, Peking University Press, 1992.
  Content: propositional logic, term logic, predicate logic, modal logic, naive set theory and inductive logic (probability theory is included).
- He Xiangdong, *Logic Textbook (luoji jiaocheng)*, Higher Education Press, 1999.
  Content: Basic laws, propositional logic, term logic, predicate logic, modal logic, inductive logic (probability theory is included), logical method of science, pragmatics, argumentation and analysis on informal fallacies.
- Wang Lu, *Basis of Logic (luoji jichu)*, Tsinghua University Press, 2004
  Content: propositional logic, term logic, predicate logic, first order logic theory, thought and language (metaphor, induction, dialectics and mistakes.)
- Huanghuaxin and Zhang Zexing, *Introduction to Logic (luoji daolun)*, Zhejiang University Press, 2005.
  Content: propositional logic, term logic, predicate logic, modal logic, inductive logic, logic of pragmatics (context, speech act, presumption, Gricean theory), informal logic (argumentation, mistakes).

On the other hand, mathematical logic textbooks have been adopted for advanced logic course whenever the curriculum allows that. The disagreement between the above two competing views somehow has to respect the reality.

Finally, a number of English textbooks has been translated into Chinese during this period. For instance, the Chinese version of Suppes' *Introduction to Logic* and Copi's *Symbolic Logic* appeared in 1984 and 1988, respectively. They have been popular in China since then, and new ones will appear, such as GAMUT's *Logic, Language and Meaning*. What is worth mentioning is also the fact that nowadays many Chinese logicians can read literature in English, some even use English logic textbooks directly in class, so both teachers and students are more open to the world than the previous generations.

5 Conclusion

We have given an impression of logic teaching in philosophy departments in China today. As far as we know, logic is being taught in other fields, e.g. law, politics, computer science and linguistics in many universities. Clearly, it would

be useful to do a similar survey of logic teaching in those areas and make comparative studies. But even on the basis of our philosophy-oriented material, compared with logic education in many other countries, a considerably smaller number of Chinese students gets the chance to learn modern logic. China has a lot to catch up in this respect. Finally, this paper has only talked about the past and the present of logic teaching in China. There is a lot to be said about the future in terms of content and new directions. We must leave the latter topic for another occasion.

Bibliography

[1] Wu Jiaguo. Developement of logic in China and my reflection on logic teaching in Chinese Universities. Manuscript, 2010.

[2] Wang Lu. On the teaching of logic in China. *Journal of Southwest China Normal University (Humanities and Social Sciences Edition)*, 25(2), 1999.

[3] Ma Pei. A further comment on the teaching of logic in China: to discuss with Mr. Wang Lu. *Journal of Southwest China Normal University (Humanities and Social Sciences Edition)*, 25(5), 1999.

[4] Xing Taotao. Logic modernization: today's understanding and practice. Manuscript, 2010.

[5] Song Wenjian. *Import and Studies of Logics (luojixue de chuanru yu yanjiu)*. Fuzhou: Fujian Renmin Press, 2005.

[6] He Xiangdong and Yuan Zhengxiao. Reviewing and prospecting of Chinese logic teaching. *Journal of Southwest China Normal University (Humanities and Social Sciences Edition)*, 26(4), 2000.

[7] Zhuge Yintong, Zhang Jialong, Zhou Yunzhi, Ni Dingfu, Zhang Shangshui, and Liu Peiyu. *Principles of Formal Logic (xingshi luoji yuanli*. People's Press, 1982.