The "World Currents of Thought"

– Brief Glimpses into the Archives of Mathematical Logic at Tsinghua University

Jan Vrhovski
University of Ljubljana

For any scholar interested in the history of either analytic philosophy, mathematical logic or even dialectical materialism in China, the "World Currents of Thought" (*Shijie sichao* 世界思潮) supplement to the *Dagong bao* 大公报 (*L'Impartial*) newspaper may prove to be a treasure-trove of invaluable material. This rich and, when it comes to the development of analytic philosophy and philosophy of science, extremely informative weekly supplement to the *Daogong bao* was edited by the Tsinghua professor Zhang Shenfu 张申府, while its regular contributors included also other notable members of the Department of Philosophy at Tsinghua, such as, Feng Youlan 冯友兰, Zhang Yinlin 张荫麟, Zhang Shenfu's brother Zhan Dainian 张岱年, and so on. The opening issue of the supplement appeared on September 9, 1932. From its inauguration in late 1932 up to its final issue on December 27, 1934, altogether 88 issues of the supplement were published, first on a weekly and finally also on a biweekly basis. Due to the active participation of important Chinese intellectuals, not only from Tsinghua but also from other Chinese universities, the "World Currents of Thought" supplement grew to become an important, if not even the central, platform for dissemination, development and popularization of ideas from Western analytic philosophy in 1930s China.

Thus, apart from subjects advanced cooperatively by the brothers Zhang Shenfu and Zhang Dainian – these were related mostly to their common infatuation with Bertrand Russell as well as their shared advocacy of the idea of synthesis between logical analysis and the dialectical method, this important supplement was also one of the earliest consistent platforms for introduction of, for example, the philosophy of Vienna Circle, positivist philosophy of science, advances in contemporary mathematical logic, foundations of mathematics, and other trendy topics in Western philosophy.

In this contribution, I shall present to the readers a brief insight into two less known documents that provide an important testimony about the richness of research in mathematical logic at Tsinghua Department of Philosophy in the early 1930s. Both contributions were originally published in the above-mentioned supplement and are, generally speaking, less researched by the contemporary scholars in the field of history of modern logic and analytic philosophy in China. Most importantly, they can be efficiently used to fill in some empty spots in the narrative about the early development of mathematical logic at Tsinghua, casting some additional light especially on the advancement of system of mathematical logic as constructed in the monumental *Principia Mathematica* by Russell and Whitehead.

Early Efforts of a Promising Student

Among the abundant material relating to mathematical logic, we can also find one of the earliest papers of the renowned logician Wang Xianjun 王宪钧. Still a student at the department of philosophy, during the summer holidays of 1933 (August 3), Wang published a short paper entitled "On Circular Definitions" (*Lun xunhuan jieshuo* 论循环界说), in which he argued adamantly against the "common explanation of circular definition in books on logic" (Wang

1933). In one of his earliest papers on questions related to logic, Wang thus aimed at amending, what he refers to as, the common interpretation of circular definition, by providing a relatively elementary exposition of the relations between *definiendum* and *definiens* in two types of definition: arbitrary and real definitions. Probably the most revealing feature of Wang's analysis constituted the fact that he used examples of definitions from *Principia Mathematica* (e.g. *PM Df* 1.01, 2.33 etc.). This is a tremendously important feature of Wang's article, for it undoubtedly represents one of only few, if not the only concrete, early testimony about the results of teaching the *Principia Mathematica* at the philosophical department at Tsinghua. In the same year when his article was issued, Wang namely became a graduate student of logic at the department, after having completed his undergraduate training in natural sciences at the Nankai University in Tianjin.

Aside from the fact that the discussed writing may have been the result of Wang's studies at the department, the year of its publication also marked an important milestone in teaching of mathematical logic at Tsinghua. At the start of this academic year, Jin Yuelin namely returned from his one-year visit at Harvard University, which left a profound imprint on Jin's understanding of logic, instilling into his conception of Russell's system of logic the contemporary discourse advanced within the Harvard school of symbolic logic (see Vrhovski 2021, 7-8). In addition to ushering a gust of fresh wind into the theoretical trends at the department, the growing presence of the American symbolic logic in the content of lectures also gave rise to certain tensions between two "main currents" at the department. Mild antagonisms of adherences became also expressed in the "World Currents of Thought". Having remained the sturdy adherent of Russell's mathematical logic, Zhang not only often addressed the relationship between Russell's mathematical logic and symbolic logic as developed by the Americans, but in addition also started more passionate propagation of symbolic logic as developed by European logicians at the time, including Carnap, Scholz and the Polish logicians.

Considering the important historical significance that Wang's essay has for our understanding of the current teaching-related circumstances at the department, here, we shall take a closer look at least at the conclusions of his rectification of the common notion of the circular definition with the use of the *Principia*. Wang concluded his analysis with the following four *points*:

> *(a) The usual explanations of circular definition which can be found in books on logic are wrong.*
> *(b) In an arbitrary definition, (1) the definiens cannot include the whole definiendum. (2) If a definition of arbitrary sentence must contain the entire definiendum, then this sentence cannot be included in the sentences of the definiens.*
> *(c) The question of circularity of an arbitrary definition, such as that linking a few propositions, can be easily revealed in a deductive system, and not otherwise.*
> *(d) Circularity and non-circularity of real definitions cannot be discovered from the outside appearance of its [constitutive] sentences. By completely recognizing whether their definiens can be indicated, we delimit the exact meaning of the words and symbols it employs, and fix what it denotes. Because of this, the question of their circularity is related to the question of form of knowledge and is not purely logical. Before many questions are resolved in epistemology, I am afraid that real definitions cannot be completely resolved. (Wang 1933)*

Albeit not theoretically too significant, these conclusions are of considerable importance for our understanding of the manner and tendencies of teaching of mathematical logic at Tsinghua.

However, at the same time we must also consider the fact that the article might have been published under support of Zhang Shenfu, the editor of the supplement and the unofficial representative of the, as it were, "Russell fraction" at the department. Confirmation of supposition may be recognized in the fact that Wang's claims have been supported by several publications and translations authored by Zhang, including a summary of Walter Dubislav's work *Die Definition* [*The Definition*] (1931) which was published issue 79 of the "World Currents of Thought" supplement. Above everything else, Zhang's indisputable role in the cluster of intellectual phenomena under discussion can be significantly illustrated in the next important publication related to modern logic.

A Rare Display of Scholarly Spirit

A comparatively more striking contribution can be encountered in the issue 74 of the supplement, published on June 14, 1934. In a rare display of his scholarly prowess, the editor Zhang Shenfu wrote a paper entitled "Proof of Tautology" (*Tuota de zhengming* 拖沓的证明). As a matter of fact, this paper represents one of only few writings in which Zhang discussed, so to say, more technical or theoretical issues related to mathematical logic or logic in general. The main aim of his analysis from 1934 was to complement Jin Yuelin's 金岳霖, at the time comparatively influential, article "Interpreting Necessity" (*Shi biran* 释必然), published one year earlier in the *Qinghua xuebao* 清华学报.

In the rare display of his scholarly skills from 1934, Zhang posited that Jin's demonstration of the "five formal principles of Russell's theory of deduction" were necessary propositions, could in fact be simplified and, in certain regards, stated in more detail, while what in the closing parts of his article Jin regarded as necessity ware in fact tautologies (Zhang 1934). To prove the existence of tautology Zhang first went at some length by providing a clearer definition of the "five formal principles" of the *Principia* – principle of tautology, principle of addition, principle of permutation, associative principle and principle of summation. Subsequently, he also listed: firstly, a series of complementary definitions and their derivations, including De Morgan's Formulae used in propositional calculus (i.e. examples from *PM* such as *4.5 and *4.6), secondly, propositions pertaining to the law of tautology (e.g. *PM* *4.24 and *4.25), thirdly, propositions explaining the meaning of disjunction, and a general definition of tautology in two-valued calculus. Subsequently, he also provided three definitions of tautology, involving one, two and three different propositions. Having listed all these definitions and their derivations, Zhang then provided his simplified proof of tautology (in the sense of being always true) of the five principles:

Finally, he also proposed a version of solution using the Venn diagrams. Apart from other important features, Zhang's criticism of Jin's work reconfirms the feud between these two foremost members of the Tsinghua philosophical department, which started already back in the late 1920s, with Zhang's unreciprocated critique of Jin's article on logical paradox and self-contradiction (1927). That the two scholars were not on the same page when it came to their philosophical adherences as well as the style of their academic undertakings is also reflected in the fact that Jin was probably the only member of the department, who had not contributed to Zhang's supplement, while the antagonisms between their notions of mathematical logic was also more explicitly manifested in Zhang's open skepticism against and disregard of American "symbolic logic" (Zhang 1932), which was an important source of ideas to Jin. However, akin to Wang Xianjun's seminal work, Zhang's demonstrations of his theoretical prowess were not as theoretically significant as it is for our retrospective insight into the rich patterns of teaching and complex dynamics in research of mathematical logic at Tsinghua Department of Philosophy in the 1930s. Moreover, our awareness of such contributions may help us not only to gain a more complete picture of the so-called "Tsinghua School of Logic" but more so provide the missing pieces to individual scholars' intellectual biographies, hereby revealing to us the previously less well-known aspects of their thought.

Last but not least, when it comes to the role and value of the "World Currents of Thought" supplement for the dissemination and advancement of mathematical logic in China, probably the greatest contribution consisted in the extraordinarily timely and regular reports on the most recent trends and publications in the West: from various textbooks and general treatises, reports

from conferences, to theoretical novelties like the theories advanced by the Vienna Circle (Carnap, Gödel) and the many-valued logic developed by Polish logicians (Zhang referred to them collectively as "logical analysis *luoji jiexi* 逻辑解析"), down to the recent advancements in foundations of mathematics. As the first major and consistent platform, showcasing at least a segment of developments within the Tsinghua circle of philosophers, the "World Currents of Thought" supplement thus undoubtedly represents an extremely precious source of information about this pivotal period of modern Chinese intellectual history.

References:

Vrhovski, Jan. 2021. "'Qinghua School of Logic': Mathematical Logic at Qinghua University in Peking, 1926-1945." *History and Philosophy of Logic*, Vol. 42, No. 3: pp. 247-261.

Wang, Xianjun 王宪钧. 1933. "Lun xunhuan jieshuo 论循环界说 (On Circular Definitions)." *Dagong bao* 大公報 [*L'Impartial*], August 10, in "Shijie sichao 世界思潮 [World Currents of Thought]" No. 50: p. 11

Zhang, Shenfu 张申府. 1932. "Jihao luoji 记号逻辑 (Symbolic Logic)." *Dagong bao* 大公報 [*L'Impartial*], December 22, in "Shijie sichao 世界思潮 [World Currents of Thought]" No. 16: p. 8.

Zhang, Shenfu 张申府. 1934. "Tuota de zhengming 拖沓的证明 (Proof of Tautology)." *Dagong bao* 大公報 [*L'Impartial*], June 14, in "Shijie sichao 世界思潮 [World Currents of Thought]" No. 74: p. 11.