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Knowledge Reproduction, Dissemination and Officialization Dilemma of Gao Mengdan's Calendar Reform

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Abstract:

Focusing on Gao Mengdan's week calendar, this paper examines his knowledge network across two dimensions: the acquisition and dissemination of global knowledge, and his contradictions with the Nanjing Nationalist Government on constructing the modernity through calendar. Gao Mengdan devoted his life to calendar reform. His research on the calendar was fueled by traditional ideas and benefited from absorbing knowledge on worldwide calendar reform. Together, they formed his knowledge network of the subject. He explored the modern values of traditional calendar reform concepts and transformed them into modern scientific discourse. His calendar reform constructed a blueprint into three interconnected strands: the adoption of the Gregorian calendar era; the advocacy for a thirteen-month system, each month comprising four weeks; and the proposals for intercalation methods and additional days. These components reveal a pragmatic synthesis of foreign scientific knowledge and local temporal needs. Gao Mengdan mainly relied on the Commercial Press to acquire the global knowledge worldwide, and disseminate his week calendar proposal, revealing the Shanghai's unique urban space and popular culture which emphasized the standardization of time. Despite the praise from some intellectuals and respondents in official soliciting, the Nanjing National Government still postponed its review and week calendar's further implementation, revealing the conservativeness. By situating Gao Mengdan's neglected endeavors within the broader discourse of global time standardization, this paper illuminates the complex dynamics of knowledge transformation, dissemination and multiple discussions on constructing the temporal modernity in early twentieth-century China.

Keywords: Gao Mengdan; Calendar reform; Knowledge reproduction; Knowledge dissemination; Officialization dilemma

In today's calendar reform, the concerns of calendar scholars account for no more than a tenth, while social concerns dominate, constituting nine-tenths.

——The Institute of Astronomy at the Academia Sinica, 1931[1]

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In the twentieth century, the scientific significance of the solar calendar was recognized. Its expanded influence was accompanied by a Euro-American sense of time and the recognition of the calendar throughout China. Thus, calendar reform in modern China can be viewed as the epitome of its modernization, becoming a substantial enterprise for whole society. However, the solar calendar was not convenient enough to work as a perpetual calendar because of its unequal distribution of dates. Chinese knowledge elites, endeavored to build a bridge between traditional cultural heritages and modern scientific knowledge, for a modern calendar and standard time order.

Gao Mengdan (1870-1936), as an important scholar among modern knowledge elites, endeavored to build a bridge between traditional cultural heritage and modern scientific knowledge, for achieving the modernization. He was an important publisher, educator, and reform thinker from Changle, Fujian. In 1890, he became a family teacher for his cousin Wei Han, who worked as the general manager of shipbuilding in the Fuzhou Shipbuilding Bureau.[2] Thus, he gained first-hand exposure to new ideas in Fuzhou, an important treaty port. Five years later, he followed his elder brother Gao Fengqi to Hangzhou to help start two new-style schools, the Sericulture School and Qiushi Academy. Subsequently, he began to systematically study Japanese. Acknowledging the need for official calendar reform, Gao Mengdan began his research on calendar reform, which can be traced from his first article, *My Personal Illustration on Calendar Reform,* completed in 1900, to *The Thirteenth-Month Calendar* in 1931, which marked the maturity of his week calendar. The result was his week calendar proposal. It was a reformative calendar concept in which the core time unit was a week. It divided one year into thirteen months, with each month containing four weeks, and each week containing seven days. The remaining days of the year were termed “unrecorded days” or “additional days.” In 1928, Gao’s week calendar proposal was discussed at the First National Education Conference in Nanjing. In 1931, the draft resolution of the proposal was submitted to the League of Nations for further examination, becoming part of the international calendar reform movement and instigating the globalization of his concept. Unfortunately, as the Chinese People's War of Resistance Against Japanese Aggression broke out, the further official review of week calendar was indefinitely postponed and Gao’s endeavor finally failed.

Despite the failure, Gao Mengdan’s week calendar proposal already garnered support from over a hundred groups and thousands of respondents. It ultimately occupied a prominent position in the Republican calendar consultation. Research on his calendar reform examines the reasons underlying the eagerness of late-nineteenth-century Chinese to discuss the subject, the components that formed the broad knowledge structure, and the channels whereby these ideas entered into the global time standardization. Ultimately, we can understand how his week calendar—shaped by the public knowledge dissemination and technical de-specialization — is radically related to Chinese modernity construction. However, over a long period, the academic

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community paid scant attention to Gao Mengdan's calendar reform research. Gao Mengdan becomes a silent calendar reformer in China's history who is unknown to scholars and the public. Lu Renlong from Zhonghua Book Company once lamented that no one had written about Gao's deeds systematically.[3] Monographic studies on the production, dissemination and official discussion of his calendar reform knowledge are limited. Zhan Xiaobai analyzed the world consciousness of Gao Mengdan's calendar reform.[4] Years later, Zhang Lei and Xu Tianmin illustrated the Gao's contradictions between modern Chinese's national and world imagination.[5] These existing researches on Gao Mengdan oversimplified views of his global views under the nationalist vision, neglecting his individual contributions to achieve the modern temporality through time standardization based on traditional and foreign knowledge.

Clearly, research on Gao Mengdan's calendar reform is wide open for further discussion, especially in topics such as the absorption of calendar reform proposals at home and abroad, intercultural reading practices when gaining foreign knowledge, and his contributions to world calendar reform. Insight into these topics on knowledge would greatly enhance the understanding of the generative mechanisms and practical effects of dissemination in international contexts. In addition, they would highlight the struggle and mediation of Chinese culture's international exchanges. In summary, this paper argues that Gao Mengdan's forgotten calendar reform proposal was not merely a technical attempt, but a typical case that reveals the creative efforts of China intellectuals reconciling universal scientific rationality with local cultural identity amidst the global wave of time standardization in the first half twentieth century.

Based on the above, this paper's discursive structure is as follows: First, we provide a detailed introduction to knowledge sources of each component in Gao Mengdan's week calendar proposal from the perspectives of specific elements in his week calendar, and verified his reproduction of popular calendar knowledge. Second, we analyze the platforms Gao Mengdan relied on to acquire and disseminate his global knowledge, such as famous publishing institutions and important newspapers and periodicals. Third, we make a profound reflection on the failure of week calendar reform, indicating Gao Mengdan's divergence on constructing modern calendar with the authorities. Finally, we summarize the uniqueness and typicality of Gao Mengdan's case, and emphasize the value of individual intellectual's efforts within the grand historical process. This paper on the global knowledge of modern intellectuals and its sources helps deepen the thinking about modernity as it applies to modern China's knowledge transformation. Moreover, it reveals their comprehensive use of traditional and modern knowledge resources in China's early scientific stage, and reflects the scientific attempts of calendar researchers located in China during the expansion of Western thought.

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Global Knowledge Acquisition and Personal Knowledge Transformation of Gao Mengdan's Calendar Reform

During a period of intense Sino-Western cultural exchanges in modern China, Gao Mengdan eagerly sought to use calendar reform to construct a modern science and temporal order, while also providing the international community with a new time system. Seeking a global calendar applicable to both Chinese and international society, he meticulously reviewed the history of calendars across classical civilizations and focused on global modern calendar reforms since the nineteenth century. Based on diverse sources of knowledge, he constructed a week calendar proposal. Gao divided a year into thirteen months, each containing four seven-day weeks. The remaining one or two days were left as blank days not belonging to any week, placed at the end of the year. He followed the Gregorian calendar's leap day method which is 97 leap days in 400 years. The first day of the year falls on Monday of each week. This calendar established a stable numerical relationship between the lunar month and the solar year. Gao Mengdan constructed his global knowledge system in formulating week calendar proposal through both textual and experiential sources.

On knowledge in the Gregorian calendar era

Gao Mengdan's understanding of the Gregorian calendar era stemmed from his work experience and social activities in his twenties. As noted in the Introduction, Gao Mengdan left his hometown in 1890 to live at his cousin Wei Han's house and work as a teacher in the Majiang region.[6] It was the home of the Fuzhou Shipbuilding Bureau, which Shen Baozhen and Zuo Zongtang had founded in 1866 as an innovative modern school and military industrial enterprise under the influence of the Westernization Movement. The Fuzhou Shipbuilding Bureau not only introduced foreign technology but also adopted advanced industrial management methods. To ensure time accuracy within the factory, Prosper Marie Giquel oversaw the construction of a towering French-style clock tower, housing a chime clock and other timekeeping devices to guide the daily routines of craftsmen and students.[7] After its completion, the Fuzhou Shipbuilding Bureau standardized its timetable. Similarly, the internal school established defined teaching periods, such as a fixed 90-minute session in the morning for French and two hours in the evening for natural sciences.[8] In terms of vacation, the Fuzhou Shipbuilding Bureau initially prohibited Sundays, and only granted holidays during the Dragon Boat Festival and Mid-Autumn Festival.[9] Later, the bureau established a more scientific system of public holidays, allowing workers to receive their wages on Sundays and enjoy a day off.[10] At that time, China had not yet widely adopted the 24-hour clock or week system. Following earlier concessions in Shanghai, the Fuzhou Shipyard and its surrounding areas in 1866 became another regional community in China to systematically engage with Western time. Modern time centered on the week and 24-hour system had already penetrated deeply into the Majiang region, forming a new work culture that could rival the traditional labor system.

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Leveraging the internal time standards of the shipyard system, the Westernization Movement ushered in the homogenization of time systems while developing industry.

Gao Mengdan's move first exposed him to the unique temporal culture of the Majiang region, which profoundly shaped his interest in studying the calendar. He could interact with the workers and students at the Fuzhou Shipbuilding Bureau because Wei Han was the general manager there. By living there for five years, he believed that "the concept of the week gradually took root in my mind."[11] He advanced the idea that the failure to use a week as a central time unit in calendar reform presented a daunting obstacle to traditional and Gregorian calendars. He hoped to establish a new calendar that conformed to the modern temporal order but did not violate the operating principles of the traditional calendar. His goal was to stabilize time for new factories and schools. However, at this early stage, Gao Mengdan had yet to articulate a clear approach to constructing a modern, standardized temporal order through reforming the calendar.

Based on the practice in Fuzhou, Gao Mengdan's contemplation on calendar reform began in the last decade of the nineteenth century. In his calendar research, he primarily focused on the epochal change, as the determination of chronology is the initiation point and logical basis of calendar reform. In 1896, he published an article in the reformist journal *The Review of the Times*, focusing on how Emperor Peter I of Russia and Emperor Meiji of Japan had successfully implemented reforms through redefining the calendar. He used foreign affairs to emphasize the urgency of calendar reform, hoping to maintain the political tradition of revising the calendar system through successive dynasties. He believed this method would help resolve internal conflicts, promote diverse new knowledge, and advance international exchange.[12] This political approach would integrate the governance measures of ancient Chinese kings with the modernization reform path of current powerful nations. Including the calendar in this vision reflected Gao Mengdan's reform consciousness. However, he mistakenly assumed that Japan's adoption of the Gregorian calendar during the Meiji Restoration was similar to the ancient Chinese dynasty's change of calendar, ignoring that Japan became a modern country in the second half of the nineteenth century. Nevertheless, that assumption reflected his reform ideas of enriching the connotation of the classical concept of "changing the calendar." Owing to his limited experience and personal confusion, he could not appreciate the current situation of traditional culture. Thus, he rashly equated calendar reform under a modern government with that of the ancient regime. To intellectuals before and after the Reform Movement, the calendar still symbolized the supreme political authority that had evolved gradually during thousands of imperial years.

Gao Mengdan's social engagements in Fuzhou provided an important impetus and experiential foundation for his study of calendar reform. The Chinese and foreign books and periodicals he perused truly formed the knowledge basis for his proposal of a reformative week

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calendar. Based on his practice in southern China, he decided to achieve his aspiration for achieving a global time order in China.

On knowledge in dividing basic time units

The thirteen-month division is Gao Mengdan's week calendar's most revolutionary element, which reconstructed the time structure with world vision. At first, Gao Mengdan tried to insight into Chinese calendar history for improving the month division. Among Chinese cultural heritages, he especially praised Shen Kuo's "Twelve Qi Calendar" in Northern Song Dynasty, believing it accurately and evenly divided days in each month and met the need for a simpler calendar. Furthermore, two major calendar reforms in the nineteenth and twentieth centuries gained Gao's praise: the Taiping Movement's compilation of the Heaven calendar and the Provisional Government of the Republic of China's adoption of the Gregorian calendar.[13] These two calendars incorporated technical elements of the Gregorian calendar, improving the arrangement of days and the rules for intercalation. Both represented relatively advanced calendars. The experience in development of Chinese calendar reform inspired Gao Mengdan to delve into the division of the month and week system.

Regarding the knowledge of month and week division in Chinese history, Gao Mengdan preferred a combination of traditional texts, research monographs, city guides, newspapers, and periodicals. He had deep insight into the ancient classics, such as *The Book of History*, *History of the Former Han Dynasty*, *Brush Talks from Dream Brook*, *History of the Yuan Dynasty*, and *History of the Ming Dynasty*. He also used recent Chinese academic monographs, such as *The Collection of Research on Ancient China Astronomy* and *Preliminary Discussion on Calendar Reform*.[14] Through reading, he learned of the multiple efforts of Chinese scholars exploring calendar reform; he then focused on precision using Shen Kuo's "Twelve Qi Calendar" to arrange the days in every month[1]. Gao Mengdan was impressed with this calendar which redivided the days in each month, with 31 days in long months and 30 days in short months. Furthermore, Gao Mengdan carefully read the miscellaneous history of the late Qing Dynasty and researched works on the history of the Taiping Movement, including Xu Yaoguang's *Tale of the Taipings in Zhejiang*, the *Collection of Sixteen Interesting Documents of the Taiping Movement* edited by Liu Fu, and Wang Zhongqi's *Revolutionary History of the Taiping*

[1] Gao Mengdan's proofreading and analysis of the *Brush Talks from Dream Brook* revealed the foundation of classical literature. He proofread and analyzed the core ancient version of the book: *The Supplement of Brush Talks from Dream Brook* containing two volumes in the *Baoyantang Series*, as well as other versions of *The Supplement of Brush Talks from Dream Brook* in Ming-Qing serial books such as the *Ancient Books Collection*, *Study on the Origin of Learning* and *Secret Book of Scholarship*, the *Baihai Collections*, and so on. He also referred to secondary citations in the *Biography of a Traditional Mathematician* and *The Brief Discussion of Calendar Reform*. Gao Mengdan applied several types of proofreading methods to his calendar reform research. *The Supplement of Brush Talks from Dream Brook* was republished in 1922. See Chen J. R. (Ed.) (1922), *Baoyantang Series, Volume 38*, Wen Ming Press.

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Movement. From these, he gathered an understanding of the principles of the Heaven calendar.[15] *Novel Monthly* was a literary magazine founded by the Commercial Press and subsequently renamed *Novel World*. Gao Mengdan quoted an article from it and summarized the implementation of the Heaven calendar in the grassroots society of the Taiping Movement.[16] These historical materials and writings were not all monographs on the ancient calendar; most were comprehensive works containing a wide range of knowledge. Gao Mengdan also made trade-offs in his reading, absorbing Shen Kuo's *Brush Talks from Dream Brook*, while only skimming through and briefly quoting works related to the history of the Taiping Movement.

Additionally, Gao Mengdan studied the history of calendar from diverse civilizations and modern calendar reform, absorbing the diverse concepts of month and week division. He especially focused on the various practical efforts that major countries made to implement the week calendar.

Evaluating the development of modern calendar reform, Gao Mengdan realized that the Gregorian calendar was not perfect, especially in week division. First, a stable numerical relationship between the week and the year was yet to be established, resulting in uncertain holiday dates. The frequent fluctuations of Easter, in particular, complicated planning. Furthermore, the irregular number of weekends per month presented operational challenges, particularly in determining rest days and calculating wages. Finally, the variable number of weeks per year hindered the development of simple and effective statistical compilations in climate or economic fields. Thus, Gao Mengdan regarded the week calendar as the most reformative solution to the Gregorian Calendar. The prototype of this calendar can be found in the apocryphal Jewish biblical text *The Book of Jubilees*. Then he found that, in 1849, the French philosopher Auguste Comte created a Positivist Calendar. This calendar was a systematic week calendar proposal, in which the entire year was divided into 13 months, each month containing 28 days, and the remaining days were fixed festivals near the end of the year. A more systematic week calendar was the basis of the International Fixed Calendar movement founded by Moses B. Cotsworth in 1902, gaining support from Euro-American businesses. In 1927, Cotsworth's calendar concept was included in the League of Nations Calendar Reform Report. In 1905, George M. Searle and Lewis J. Heatwole suggested dividing a year into 13 months, with 28 days and an additional week every five or six weeks.[17] The thirteen-month calendar, which already had a basis for discussion worldwide, also solidified his idea of reforming Gregorian Calendar.

The emergence of week calendar proposals illuminated the Euro-American scholars' thinking of the time, aimed at improving practices to overcome the disadvantages of the Gregorian calendar. To implement weekly schedules, Central and Eastern European countries used mostly five- and ten-day weeks to collect weather statistics. Northern and Western

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European countries tended to apply a seven-day week period to calculate data. The U.K. and U.S. were already using weekly calendars for weather statistics collection, traffic management, and business operations. The Soviet Union's calendar reforms also attached importance to the week system.[18] In June 1929, Yuri Mikhailovich Larin, a Soviet writer and economic scholar, proposed a weekly system called the Continuous Work Week, which divided workers into seven groups. These groups would rotate work shifts to ensure the continual operation of factories, increase industrial production, and alleviate unemployment. At the end of 1929, the Soviet Communist Party Central Committee adopted Larin's idea and abolished the Gregorian calendar in favor of a week calendar. Each year had twelve months, and each month contained six five-day weeks. Additionally, a five-day holiday was placed at the end of the year, and a six-day holiday was placed during leap years.[19] After analyzing the diversity of the week system proposals and reform practices in Euro-American countries, Gao Mengdan clarified that the week system was the fundamental regime that had gained wide application in the areas of scientific research, enterprise management, and agricultural production. Simultaneously, it could maintain the social life of various countries worldwide. The switch to the week calendar would not only meet the needs of modern life but also conform to the general trend of global calendar reform.

How did Gao Mengdan know that Europe and the United States were undergoing a reform of the Gregorian calendar? Important sources of his knowledge of current affairs were modern newspapers and periodicals, such as *Eastern Miscellany* and *Contemporary*. He read the article *Discussion on Calendar Reform,* translated from English into Chinese by Chen Hengzhe, in *New Calendar* edited by *Eastern Miscellany*, which revealed that Euro-American scholars such as Moses B. Cotsworth had proposed systematic calendar concepts.[20] After reading his nephew Gao Lu's essay, *The Introduction of the Universal Calendar*, he felt compelled to build a "universal calendar" for the international community and further improve the idea of the week calendar.[21] *Contemporary* was a publication founded in 1928 that presented topics from various countries. This magazine informed him of the calendar reform activities of the League of Nations and the International Labour Organization, reinforcing his understanding of the international calendar reform movement.[22] To gain foreign knowledge, Gao Mengdan also examined a portion of materials written in other languages, with the League of Nations Classification and Summary of Proposals for Calendar Reform as his core reading. For simplicity, he divided all the proposals contained within the report from the League of Nations into thirty-five categories and then reviewed their reasoning. Consequently, he introduced the International Fixed Calendar compiled by Moses B. Cotsworth in detail to the Chinese calendar reform movement.[23] He also consulted Julia E. Johnsen's English monograph "Thirteen-Month Calendar," thus learning about the basic global attitude towards the thirteen-month calendar.[24] Furthermore, he quoted Shinjo Shinzo's interpretation of the solar calendar in

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Western history from a Japanese astronomy-related journal called *The Heavens*.[25] Additionally, he discovered from reading the translation by Xu Jianmin of Eunice Fuller Barnard's article in *The New York Times Magazine* that European and American countries were undergoing a solar calendar reform movement.

Gao Mengdan paid much attention to achieving time standardization and effective social management, revealing his ideal on modernizing the time order. The thirteen-month division was his most reformative technical improvement in time standardization compared to the Gregorian Calendar. Evidently, he possessed a profound comprehension of the rationality underlying Chinese calendar reform, while also integrating technical advancement under a global framework into his knowledge structure. This dual perspective enables a comprehensive evaluation of the historical trajectory and modernity of the thirteen-month calendar system, reproducing the knowledge of basic time units division.

On knowledge in intercalation method and additional day

Gao Mengdan finally adopted the leap day method of solar calendar from the Hijri calendar, which is 31 leap days in 128 years, to better fit the solar cycle. He also paid much attention to setting an additional day for improving his week calendar proposal.

First, he divided the history of Western calendar development into four phases: the Greek, Roman, Christian, and current Gregorian. This development process indicated a shift from the lunar to the solar calendar. In 713 BC, the king of Rome, Numa Pompilius, constructed a twelve-month calendar based on the Greek version. In 432 BC, the Greek astronomer Meton of Athens first proposed a scientific leap-year method, which consisted of placing seven leap months over 19 years. In 46 BC, Gaius Julius Caesar advocated the adoption of the Julian calendar. This system, the most complete at that time, was used for centuries in European territories. In 1582, Pope Gregory XIII proposed a leap day method for the Julian calendar, which would add a leap day every four years, but not every 100 years, thus creating a rule of 97 leap days in 400 years, which better fit the solar cycle.[26]

Then, Gao Mengdan seeks to examine the intercalation principles in some non-European ancient civilizations, aiming to substantiate the rationality of the rule of 97 leap days in 400 years. Among the calendars of these civilizations, he paid close attention to the solar calendar of Ancient Egypt, the eighteen-month calendar of Ancient Mexico, and the Hijri calendar of ancient Arabia. Although Ancient Egypt's calendar is the most time-honored in the history of the solar calendar, eventually surplus time accumulates owing to the absence of leap days, which leads to festival chaos. Ancient Mexico used a calendar in which every year was divided into eighteen months, with 25 leap days in 104 years. The Hijri calendar was created by Muhammad and is divided into two parts: the lunar year for religious use and the solar year for agricultural use. The lunar calendar has eleven leap months over thirteen years. By contrast, the solar calendar has thirty-one leap days over 128 years. The calendar's characteristics are as

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follows: the dates of the various solar positions in the lunar and solar year are quite different; the first day of each month in the lunar year is closely related to natural phenomena; and the number of days in the solar and lunar calendars is both less than that in the tropical year.[27]

After these researches, Gao Mengdan finally found the method of setting leap days in ancient Arabian civilization worth learning from. He published an article in 1934, to introduce a more precise method to place the leap year—specifically, "add a leap year every four years, and stop every 128 years."[28] His knowledge of the Hijri calendar came from *Questions about Calendar Studies*, *Calendar Records* in the *History of the Ming Dynasty*, *Origin of the Arabian Calendar*, and *Table of Calendar Elements in Twenty Chinese Histories*. A book popularizing science knowledge for the public, *Encyclopedia for Daily Use,* offered knowledge of the Ancient Arabian Calendar.[29]

Additionally, Gao Mengdan's interest in setting an additional day was motivated by the debates between four-season calendar and thirteen-month calendar. In 1911, Gao Mengdan's nephew, Gao Lu, while studying in Belgium, published an article in *The Eastern Miscellany*, outlining his proposal for a four-season calendar. He was exposed to French astronomy during his study of the four-season calendar in Belgium. The French astronomical community had discussed this calendar in the early twentieth century. It uses March 21st of the Gregorian calendar as the beginning of the year, with the year divided into four seasons, each with three months. The first and second months are both 30 days long, the third month is 31st, and the remaining day is a rest day. A leap day is added every four years. This method, aside from the quadrennial leap day, requires no changes to the dates, making it easier to remember.

The week and four-season calendars had their supporters worldwide, both aiming to achieve a long-term stable structure by redistributing the days in each month. Their core principles and compilation methods are similar. Gao Mengdan was more radical, seeking to break completely with the standard four-season and twelve-month divisions. He disagreed with Gao Lu's concept, believing that it was too dogmatic to be adopted. He stated, "Since you hope to make an ideal universal calendar program, why do you get stuck in the conventional view of dividing a year into four seasons or twelve months?"[30] He preferred inserting a festival at the end of a year to make the number of days in each year close to a tropical year, thus forming an ideal universal thirteen-month calendar. His friend and colleague at the Commercial Press, Du Yaquan, also admitted that the week calendar was more convenient than the four-season calendar. While the former can ensure that the number of days in each month is equal, the latter "is still restricted to the four seasons and twelve months... with differences between long and short months and no fixed day in the week of each month."[31]

Gao Mengdan emphasized the significance of the additional day system through reading Chinese and foreign texts on calendar reform. Additional days were defined as the remaining days in a year that were excluded from the week, quarter, and other fundamental time units.

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This system was applied to manage the difference between the human-constructed calendar year and the tropical year corresponding to solar activity. This calendar arrangement dates back to Ancient Egypt and Mexico. People living in these two places set aside five days at the end of the year, creating an additional day system. Numa Pompilius' calendar did not include additional days, causing the phenomenon of time discrepancy to grow considerably, triggering Roman public rage. In 1835, an Italian priest, Abbé Marco Mastrofini, proposed a systematic four-season calendar in which every quarter contained ninety-one days. The remaining days were fixed at the end of the year to form a special festival. Mastrofini's theory essentially combined the additional-day system and the modern calendar reform concept. In practice, additional-day systems are often used simultaneously with the leap year, which can accumulate for four or five years to form a five-day special festival, five or six years to form a week, or twenty-two or twenty-three years to form a month, with all additional time periods placed at the end of the year.[32]

Gao Mengdan began to systemically study the additional day system through four-season calendar movement in 1920s. He first read the article *Discussion on Calendar Reform,* translated Chen Hengzhe, which was edited in the monograph *New Calendar* (1923). The manuscript translated by Chen made a detailed description on the extra days in Moses B. Cotsworth's International Fixed Calendar. Additional and leap day were both excluded from the week, as "no day". Cotsworth innovatively divided the additional day with the leap day: the leap day was placed in twenty-nineth February, the additional day was placed at the birth day of Jesus as a festival. He also found the descriptions about the additional day of modern four-season calendar, in Julia E. Johnsen's English monograph "Thirteen-Month Calendar".

Gao Mengdan adopted the new intercalation method and additional day system with mathematical rationality relying on careful calculation. In a global knowledge context, he deeply explored the intellectual lineage of the Western calendar reform, discerning the separation between intercalary days and supplemental days, and ultimately facilitated the development of a precision timekeeping scheme.

Relying on the Commercial Press: Knowledge Dissemination of Gao Mengdan's week calendar

With the formation of the publishing market and consumerist culture in Shanghai, knowledge production networks gradually emerged, effectively promoting interaction between Chinese and international calendar knowledge. The Commercial Press' focus on calendar reform further fueled the mass production and rapid flow of calendar knowledge within the publishing market. These factors collectively contributed to the formation and dissemination of Gao Mengdan's week calendar, transforming his calendar research into a global knowledge enterprise. Clarifying the knowledge dissemination of Gao Mengdan helps illuminate the

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marketization of scientific knowledge in modern China.

As the most influential publishing house in modern China, the Commercial Press mirrored the main process of cultural interactions between China and the West. It provided crucial support for intellectuals by giving them access to a wide range of global knowledge. In 1902, Zhang Yuanji invited Gao Mengdan to join the Bureau of translating and editing at the Commercial Press as the director of the Chinese Language Department. He established a round-table meeting for the discussion of editing and translation work and leveraged the collegial system to put his personal stamp on the guiding principles of the institution's compilation activities. He oversaw the translation of works reflecting modern knowledge, such as *The New Translation of Japanese Laws and Regulations* (1907). Zhang Yuanji admired his meticulousness and integrity and made him responsible for the bureau's important publication projects, including textbooks, reference books, and ancient classics. Gao Mengdan dedicated his life to the Commercial Press, assuming multiple roles, including a core decision-maker, talent organizer, and exacting coordinator.

Gao Mengdan was systematically exposed to a vast range of local knowledge through the traditional education that he received in his early years. As a local intellectual who originally aimed to enter the officialdom through imperial examination, he had received ancient Chinese education since childhood, and was knowledgeable in reading and writing ancient prose. Thus, he could obtain traditional knowledge conveniently and comprehensively. He was also a professional in the modern publishing industry, and had a wide range of channels to access traditional knowledge. When working at the Commercial Press, Gao Mengdan not only emphasized reprinting and publishing historical classics such as *Si Bu Monographs* and *Twenty-Four Histories*, but also advocated for the preservation of traditional knowledge through the compilation of new dictionaries and teaching materials. On good terms with Du Yaquan and Zhang Yuanji, he was deeply involved in ancient book publishing projects, which made accessing traditional works easier for him. Additionally, he invested a significant sum from the Commercial Press to publish historical items as books, such as *The Collection of Research on Ancient China Astronomy* and the *Revolutionary History of the Taiping Movement*, and as articles in journals such as *Eastern Miscellany* and *Novel Monthly*. Under the collegial system, Gao Mengdan could also participate in important publishing discussions through round-table meetings within the Translation Bureau, yielding the compilations of *Source of Words* and *Encyclopedia of Daily Use*.

His breadth of experience at the publishing house was instrumental to the week calendar's formation and dissemination in the following three ways.

First, the Commercial Press widened Gao Mengdan's network of contacts, contributing to the week calendar's maturation and dissemination. Since his youth, Gao Mengdan had maintained close ties with reformist intellectuals, such as Yan Fu, Lin Shu, Wang Kangnian,

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and Liang Qichao. These intellectuals, mostly born between the 1850s and 1870s, studied ancient classics and participated in the Imperial Examination growing up, developing a solid foundation in traditional knowledge. They were also exposed to Western knowledge, thus forming a cultural foundation capable of "combining the old with the new." This group generally believed that traditional experience unquestionably contained modern values; therefore, they advocated gradual reform based on combining indigenous and foreign knowledge. They either supported the traditional or the Confucian calendar. Overall, they were relatively moderate and conservative. In 1898, Kang Youwei and Liang Qichao vigorously advocated for the Confucian calendar to establish a core calendar axiom tinged with local cultural symbols.[33] Gao Mengdan also began to contemplate the meaning of "axiom," parting ways with the reformists and instead advocating the Gregorian calendar. After joining the Commercial Press, he maintained close contact with Liang Qichao and others, and also engaged in in-depth discussions with intellectuals who supported reforming the Gregorian calendar. Hu Shih, Gao Lu, and other intellectuals were already regular contributors on calendar reform to the Commercial Press. They explored the dilemma of "how China could move towards modernity" through calendar reform. Networks behind the Commercial Press brought Gao Mengdan into contact with scholars who had different attitudes towards calendar reform, forming a relatively loose yet cohesive research community.

Second, the Commercial Press, believing calendar reform important, was willing to accept such manuscripts, exposing Gao Mengdan to the diverse perspectives of the academic community. In addition to Gao's monograph, the Commercial Press published a large number of calendar research works, primarily focusing on Chinese calendar studies and global calendar reform trends. These included works such as Lin Jiong's *Calendar* (1923), *The Eastern Miscellany*'s *New Calendar* (1923), Cui Chaoqing's *Chinese Cosmology* (1933), Zhu Wenxin's *Collection of Ancient Astronomical Research* (1933), *A General History of the Calendar* (1934), and Guo Tingyi's *A Critical Study of the Heaven Calendar* (1937). Furthermore, the Commercial Press undertook the distribution for books such as Shinjo Shinzo's *Ancient Chinese Astronomy* (1936) and Chen Zunwei's *Astronomical Almanac* (1938).

Domestic calendar researchers also published their articles discussing the reform in journals such as *Eastern Miscellany*, *Education Magazine*, and *Ladies' Journal*. The authors published in *Eastern Miscellany* often proposed calendar reform theory for improving the Gregorian Calendar[2]. *Education Magazine* and *Ladies' Journal* focused on the social impact of

[2] Except for proposals of Gao Mengdan, Gao Lu, other calendar reformers' theories can be seen in the *Eastern Miscellany*. See: Zhang X. C. (1913). A Case for the New Calendar Reform Based on the Week System. *Eastern Miscellany*, *9* (7), 22–23; Kuang Z. L. (1922). Explanation of the New Chinese Calendar. *Eastern Miscellany*, *19* (2), 153–154; Wang Q. M. (1922). On the Advisability of China to Establish Its Own Calendar," *Eastern Miscellany*, *19* (7), 125–127; T. P. (1929). On the Calendar Revolution: Breaking the Week Calendar and Building a New Calendar. *Eastern Miscellany*, *26* (1),

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the Gregorian calendar, presenting intellectuals and women with opinions on the official calendar reform[3]. Notably, these two journals also attracted contributions from grassroots intellectuals and women. For example, an author under the pen name Zeyou expressed concern about the changes to education management after the government and schools switched to the Gregorian calendar.[34] Jiang Gu Qinzhi, a woman from Wu County, Jiangsu, pointed out that the government and major publishing institutions had not yet established a useful timetable, resulting in practical inconveniences.[35] In general, the Commercial Press hoped to encourage people to consider the calendar in their daily lives, thereby promoting calendar reform. Gao Mengdan could obtain relevant academic resources more easily in the Commercial Press.

Third, the Commercial Press provided an important publishing platform and dissemination channel for Gao Mengdan. The Commercial Press is one of the most prestigious cultural institutions in modern China, and the name itself is prestigious. Gao Mengdan was a regular contributor to *Eastern Miscellany* and other journals published by the Commercial Press. He also had a close personal relationship with Du Yaquan, the editor-in-chief of *Eastern Miscellany*. Between 1928 and 1934, he published several papers on calendar reform in the magazine, including *Draft for the Adoption of My Week Calendar* and *Further Research on Chronology*. However, despite Gao Mengdan's prolific writings, he only published two monographs: *A Collection of Western Maxims* (1903) and *The Thirteen-Month Calendar* (1931). Both books were published by the Commercial Press. *A Collection of Western Maxims* introduced important political and philosophical theories from Europe and the United States, translated from Japanese versions of various Western works. *The Thirteen-Month Calendar* marked the pinnacle of popularizing calendar science in China. Furthermore, the Commercial Press became an important sales and dissemination channel for Gao Mengdan's calendar reform work. To boost social influence, the publishing house placed advertisements in major domestic newspapers and periodicals, including *Shenbao*, *Ta Kung Pao*, *The China Times,* and *The Republican Daily News*, demonstrating its high regard for calendar reform. The role of Commercial Press in popularizing Gao Mengdan's week calendar concept, which gained widespread reading among Chinese scholars, was invaluable.

By focusing on the production of global knowledge in China, Gao Mengdan's research on calendar reform deserves to be placed within a more fluid framework of urban history. That perspective could explain how the concept of the week calendar could spread in Shanghai. Gao

137–145; T.P. (1929). World Calendar. *Eastern Miscellany*, *26* (12), 77–96; Yu Q. S. (1937). Domestic Calendar Reform Opinions and World Calendar. *Eastern Miscellany*, *34* (13), 47–69.
Gao L. (1911). The introduction of universal calendar. *Eastern Miscellany*, *8* (6), 14-20.

[3] See Li J. M. (1912). Educators Should Correct the Habit of Calendar Observation. *Education Magazine*, *4* (5), 27–30; Ruichen. (1916). The Future Career of Women in Astronomy. *Ladies' Journal*, *2* (8), 4–8; Jiaozhi. Method of Memorizing the Months of the Gregorian Calendar. *Ladies' Journal*, *13* (6), 18.

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Mengdan's long-term presence in Shanghai, one of the most intellectually vibrant regions of modern China, exposed him to a vast array of knowledge within the city. He could align his week calendar with the unique urban space that had gradually emerged in Shanghai since the mid-nineteenth century. In Shanghai, a region deeply influenced by the rhythm of industrialized time, the public relied on calendars to guide their personal and family lives. Skilled workers needed clocks to make their work and rest schedules, and families needed calendars to clarify their appointments. Because calendar reform concerned every Shanghainese, calendars and almanacs enjoyed a stable sales channel.

Therefore, studying calendar reform in Shanghai is of great social significance. Various knowledge carriers became consumer goods readily available to urban residents. Newspapers and books facilitated the effective dissemination of popular knowledge, fostering a practical consumer culture. As a long-time, prominent publisher active in the cultural market, Gao Mengdan systematically engaged with foreign expertise in law, culture, and other fields. This work cultivated his exceptional sensitivity to standardized and rationalized knowledge, providing a cross-cultural foundation for his calendar reform research. This exposure enriched his knowledge and mirrored the circulation and dissemination of his week calendar within the evolving knowledge market. Recognizing the unique concern of Shanghai's media-based urban culture for temporal order, Gao Mengdan could draw upon diverse information to produce a systematic week calendar scheme that could meet the needs of modern cities. His intellectual production activities no longer satisfied the repetition of a single piece of knowledge but instead required a cross-cultural and interdisciplinary perspective to adapt to the ever-changing global context. This global knowledge system became critical scaffolding for Gao Mengdan's construction of modern Chinese temporal order.

Officialization Dilemma of Gao Mengdan's week calendar

Based on the global knowledge system acquired and reconstructed by diverse information media, Gao Mengdan felt confident in getting the week calendar proposal approved by the official government. Obviously, the Nanjing National Government also showed its attention on Gao's proposal as an important reform on the Gregorian calendar. It reflected the common vision of Chinese intellectuals and official government to overcome their nihilism in modern times by pursuing modernity and self-worth. However, Gao Mengdan ignored the complexity of domestic calendar reform during this strong demand for China's modernization, and fundamentally misread the government's calendar reform intentions, dooming his attempts.

Domestic and international deliberations on Gao Mengdan's Week Calendar

During the Nanjing National Government, the week calendar gained international recognition through domestic review and public consultation. In May 1928, *Sinwen Pao* published Gao Mengdan's article entitled *Draft for the Adoption of My Week Calendar*. It

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systematically compared the merits and drawbacks of the traditional Chinese, Gregorian, and the proposed week calendars. Compared with the Chinese lunar calendar, the Gregorian calendar has a set year and can be further improved. The week calendar is most convenient for reforming the Gregorian calendar. They have only one-day or two-days difference between leap and common years, and the number of days, weeks, and months of each year can be fixed.[36] This draft introduced the additional day that achieved the goal of evenly dividing the number of days in each month. Several days after publication, Gao Mengdan submitted the proposal for focused deliberation to the First National Education Conference convened by the Ministry of Education and Research, the highest educational institution. The conference invited Gao's friend Hu Shih to provide the final review. He generally approved of the week calendar, suggesting only two revisions: removing the phrase "united with non-Christian nations," which might provoke objections from Europe and the United States; and implementing it by piloting it in schools before expanding it to the public.[37] Subsequently, Gao Mengdan submitted the week calendar to the Academia Sinica, which granted its approval.

Gao Mengdan's efforts to build a universal temporal order were eventually conveyed to calendar reformers worldwide. Through his friend Hu Shih's personal network, the week calendar's draft was delivered to the National Committee on Calendar Simplification in the United States. In January 1930, the Chief Secretary of the committee, Oscar N. Solbert, wrote to Hu Shih that "Our committee is interested in this. This proposal is approximately the same as the thirteen-month calendar advocated by the United States and other countries. We have no prejudice against various calendar reform plans, but according to recent surveys, most parties support the thirteen-month plan."[38] Solbert recognized Gao Mengdan's world vision and hoped that the Nanjing National Government would establish a special committee to discuss the calendar reform issue. In 1931, the Calendar Research Association under the Ministry of Education distributed 120,000 questionnaires to various government agencies, social groups, and individuals. For the first time in modern Chinese history, the government enacted a mass calendar-reform opinion survey. More than 100,000 replied, and 86,419 people and 136 groups supported the adoption of the four-season calendar. Only 105 groups and 9,420 people supported the week calendar's use, but the responses also reflected the attitudes of some audiences.[39] The Nanjing National Government submitted the two proposals to the League of Nations and relied on its world conference to come to a final conclusion.[40]

On September 26, 1931, the Organization for Communications and Transit confirmed the receipt of Gao Mengdan's proposal. When the League of Nations Secretariat sorted the calendar reform proposals submitted by various countries, it classified his proposal into the first category of Group A: "13 mois de 28 jours: un jour complémentaire les années ordinaires, 2 jours complémentaires les années bissextiles."[41] (Each year has 13 months, each month has 28 days, with one extra day in a common year and two extra days in a leap year.) His proposal

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was in accordance with other thirteen-month calendar ideas in European and American calendar reform thought, which marked the formation of a global thirteen-month calendar movement in China. With Gao Mengdan's week calendar idea entering the League of Nations, the Nanjing National Government could join in world calendar reform, and the Chinese began to participate in discussions on world calendar reform through official channels.

Nanjing Nationalist Government's Rejection of Gao Mengdan's Week Calendar

Gao Mengdan's concept of modernity rested on an imaginary and emotionally compelling premise that China could complete calendar reform on the same temporal scale as Western societies. Historically, the West generally viewed China as a follower of modernization after 1840. Therefore, Gao's theory, which appealed to the Chinese people's desire to overturn this colonial perspective, proved highly influential at the time. Given the strength behind the theory of the week calendar itself, the First National Education Conference endorsed it and advocated further research. Chinese and international scholars such as Hu Shih, Du Yaquan, Wang Yunwu, and Oscar N. Solbert also supported Gao Mengdan's proposal. After gaining recognition at a national conference, he developed an overly optimistic assessment of China's position in global calendar reform. His goal was to make the week calendar official, thus securing China's position in global affairs. Hu Shih once warned him to examine the week calendar's practical value and avoid hastily applying it without trial. His reason was that "divergence leads to confusion in society."[42] The most suitable course of action was to await the League of Nations' review, which would reveal other countries' attitudes toward the week calendar, and decide then whether to adopt it. While Hu Shih's suggestion did not contradict the consensus of surpassing the West among Chinese intellectuals at the time, it highlights the significant disagreements over specific methods and timing. The Nationalist Government of Nanjing's acceptance of Gao Mengdan's calendar reform ideas could not conceal the profound divergence in constructing modernity, which ultimately prevented any consensus from being reached, leading to an inevitable parting of ways.

Crucially, Gao Mengdan's week calendar was overly radical and revolutionary, clashing with the government's desire for steady social reform. The Nanjing Nationalist Government also endorsed a universal calendar for constructing modernity, but wanted China to adhere to the most widely accepted calendar worldwide. It believed that switching to a new calendar before the Gregorian calendar gained widespread social recognition would disturb social governance. Therefore, the Chinese National Committee on Calendar Reform conducted a survey in 1936 and 1937 to gauge each ministry's opinion on adopting further calendar reform. The most representative objection came from the Ministry of Industry, responsible for agriculture, forestry, and commerce. This ministry stated: "Our country has adopted the Gregorian calendar for over twenty years, yet it has yet to be fully adopted in rural areas. This demonstrates the difficulty of changing the calendar in farmers' habits. We believe that the

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Gregorian calendar is already in use, and switching to a universal calendar is unnecessary, as it would only cause confusion and be of little practical benefit."[43] The ministry also commented: "Although the majority of Chinese people believe the universal calendar is superior, the League of Nations seems indifferent about this."[44] Furthermore, the Institute of Astronomy at the Academia Sinica believed the League of Nations should change the calendar first: "Because this matter concerns international unity, and since the League of Nations has already shelved the resolution, China can only remain silent."[45] Industrial and scientific research departments insisted that adopting a new calendar before the Chinese people had fully accepted the Gregorian one would undermine the modern value of standardization, leading to chaos from multiple time measurements.

While the Nanjing Nationalist Government aspired to achieve modernity by surpassing Western civilizations in numerous areas, it showed unusual caution regarding the calendar because an official version of calendar reform had failed in 1934. This national movement had been launched in 1927 and reached its peak in 1928. However, it declined thereafter, forcing the government to abandon a full switch to the Gregorian calendar: "Celebrating the Chinese New Year under the traditional lunar calendar should not be excessively interfered with, except in government agencies."[46] The government originally hoped to break the "calendar dualism" that formed after 1912, but came to realize that changing customs is difficult. It became increasingly conservative in modernizing social reforms. It even reversed its hardline stance against the traditional calendar during the peak of the National Calendar Movement, switching to support some restoration of tradition.[47]

An example of official calendar reform after 1934 was the *Calendar Designed for National Life*, compiled under the leadership of Chen Guofu, Chairperson of the Chinese Cultural Construction Association. Based on traditional customs and officially determined festivals, the book was a practical calendar for everyday life without any suggested reforms. After 1937, the Nanjing Nationalist Government, preoccupied with the war against Japan, could not spare the time for a dedicated discussion on calendar reform. Moreover, the 1934 failure sapped its desire to undertake systematic calendar reform. The official government rejected the potentially more modern week calendar to ensure the stable operation of society during modernization.

Given the government's conservatism, the support that Gao Mengdan's idealistic calendar reform proposal gained from thousands of individuals and groups during a public consultation, as well as its submission to the League of Nations, is puzzling. In 1928, his contemporary, Gao Jun, former director of the Institute of Astronomy at the Academia Sinica, elucidated the differences between ancient and modern calendar reform, providing a key clue. He wrote, "Calendar reform today… is not about the preciseness of calculation, but about the harmony of the years, months, weeks, and days. Harmonizing these years and weeks is certainly a matter

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for calendar researchers, but since accurate statistics, such as the Gregorian calendar, have long been established for these years, the calendar year system does not need to be changed. Only the start of the year still remains a matter to discuss. As for the harmony of years and months, the Gregorian month exists in name only, unrelated to the celestial movement of the moon around the earth and therefore not the concern of calendar researchers."[48] The modern calendar reforms of the 1920s and 1930s focused on reconciling the quantitative relationships of time units such as years, months, weeks, and days to achieve a stable time structure without frequent changes. That goal is a stark departure from that of astronomers and mathematicians in ancient times.

Modern calendar reform researchers prioritized practical value over mathematical precision. They sought to demonstrate the calendar's adaptability to everyday life, economic activity, and cultural interaction. These reforms lacked the fixed evaluation criteria drawn from disciplines such as astronomy and mathematics. Scholars, intellectuals, and the government could not devise a consistent criterion for evaluating calendar reform proposals. Calendar research, unlike experimental disciplines such as Medicine and Biology, must be governed by social standards, leading to the emergence of "bizarre and absurd works"[49] which defy official will. Consequently, the government allowed week calendar supporters, such as Gao Mengdan, to promote their proposals through publication. However, despite submitting proposals to the League of Nations, the government remained inactive in promoting calendar reform domestically.

We cannot understand the modern values that Gao Mengdan's week calendar highlighted through the singular criterion of science consciousness. A more complex evaluation system is needed to explain the modernity underlying his proposal. His death in 1936 caused a stir in Shanghai's cultural circles, with prominent intellectuals such as Hu Shih and Wang Yunwu writing eulogies and mourning couplets. These accounts often characterized him as a pragmatist who "advocated practical matters," "had practical knowledge," and "enjoyed practical writing."[4] How should we understand this practical spirit that Gao Mengdan's friends eloquently discussed after noting his revolutionary calendar and modernity theory? In formulating a week calendar proposal, Gao Mengdan did not overlook the pragmatic tendencies important to modern calendar reform. In *The Thirteen-month Calendar*, he demonstrated the importance of adopting a week calendar for corporate management, which can be seen as representative of his practical thinking.

However, Gao Mengdan was also an optimistic idealist, overestimating public and government's acceptance of the week calendar with little pragmatic skepticism. He also

[4] See Hu S. (1937). A Brief Biography of Gao Mengdan. *Eastern Miscellany*, *34* (1), 37; Jiang W. Q. (1936). Biography of Gao Mengdan. *Eastern Miscellany*, *33* (18), 11; Zhuang Y. (1936). Mourning Gao Mengdan. *Eastern Miscellany*, *33* (18), 15.

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rejected Hu Shih's concern that the switch to a week calendar was too hasty. Embracing the spirit of a classic intellectual who considered the world his responsibility, even when facing widespread disapproval, he decided to bring the radical week calendar into practice, to gain recognition for calendar reform researchers worldwide. However, this revolutionary calendar was too radical and threatened effective social governance, reflecting its core practical drawback. Thus, this radical reform failed to gain support from the Nanjing Nationalist Government. Gao Mengdan's week calendar was ultimately shelved in an official archival repository.

Gao Mengdan and the Nanjing Nationalist Government's different interpretations of modernity reveal that neither individual intellectuals nor the Chinese government had yet to emerge from the colonial moment. Both political and intellectual circles constructed modernity as a modern consciousness deeply shaped by colonial values. Their core consensus rested on a global perspective based on the introduction of foreign knowledge and a nationalist mentality of surpassing the colonial powers. This consensus enabled a relatively harmonious relationship before 1934, when official calendar reform was proceeding smoothly. Had the government rejected further calendar reform outright, the radical ideas of individual intellectuals would have been subject to great contingency and uncertainty, rendering reformist intellectuals unable to shoulder historical responsibility in constructing modernity. By 1934, the Nanjing Nationalist Government was no longer keen on domestic calendar reform. Only because the international momentum of the thirteen-month calendar continued did the Nanjing Nationalist Government decide to submit Gao Mengdan's calendar proposal to the League of Nations. Had this body recommended it, he may have gained the recognition of other international powers, and worldwide calendar reform may have proceeded. Unfortunately, the possibility of gaining global recognition ended with the outbreak of World War II. After it concluded, Gao Mengdan had passed away, and the thirteen-month calendar movement had already died down. During the Cold War's Iron Curtain, the two opposing ideological camps would not have adopted a common calendar. The week calendar fell into historical oblivion.

Additionally, the desire of both intellectual and political circles to surpass Western temporal hegemony is another overlooked factor driving calendar reform, particularly the construction of the "catch up with the West" theory as a shared social consensus and knowledge structure. Official documents failed to systematically address the theoretical creation and conceptual justification of this ethos within the intellectual community. During the official calendar consultation, members of the Nanjing Nationalist Government did not consider the significance of calendar reform as a vehicle for diverse cultures. Thus, the politicians could not understand the formation of a diverse modern consciousness. This lack of understanding contributed to a conservative governance model under the party-state system in its final years, resulting in theoretical rigidity, weakness, and severe social divisions. The Nanjing Nationalist

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Government, mired in a conservative mindset similar to Liang Qichao's periodic pessimism after the Reform Movement failed, viewed calendar reform as a scourge that would undermine grassroots order rather than a powerful weapon for effectively establishing a new modernity. Official thirteen-month calendar reform under the leadership of Gao Mengdan has effectively stagnated after the failure of implementing a national calendar. Ultimately, neither the conservative plans of the official government nor the revolutionary idealism of individual scholars successfully led China out of the colonial moment. This failure meant that the issue of modernity in Gao Mengdan's time has remained mired in the shadows of history.

Conclusion

Faced with China's early twentieth century integration into the Gregorian calendar system, modern Chinese intellectuals were keen to discuss calendar reform. Gao Mengdan was no exception. With the help of various information media, he reconstructed his personal knowledge system and explored a calendar reform path that was a compromise between the old and new. He integrated traditional calendar reform theory with the achievements of the modern calendar reform movement, improved the internationally accepted solar calendar, and proposed a week calendar system. His plan was not only progressive in terms of scientific rigor, but also considered the practicality of its application. His approach reflected the pursuit of modernity in the Chinese calendar reform movement and conformed to the global trend of calendar unification. Diverse knowledge from different sources was the basis of Gao Mengdan's understanding of the modern world. Its formation depended on its diverse sources of knowledge and mirrored the knowledge transformation of modern China. The establishment of China's modern knowledge system is based on the continuous accumulation of indigenous and foreign knowledge of individual intellectuals. Therefore, paying attention to the knowledge acquisition and transformation of modern intellectual groups provides a new perspective for studying the evolution of modern Chinese knowledge structure.

This study of Gao Mengdan experience with calendar reform showed that the formation and development of knowledge of modern Chinese intellectuals was not a process of blindly catering to international mainstream discourse. Rather, it was based on traditional knowledge, absorbing new knowledge and promoting the modernization and globalization of traditional culture. Diverse Knowledge and its sources reflect not only the innovative spirit of Chinese intellectuals, but also their practice of inheriting and developing traditions. Chinese culture developed over millennia and experienced many vicissitudes. Although the May Fourth and New Culture Movements fiercely criticized traditional cultures, the Chinese retained their ability to rationally and dialectically examine their modern situation and strive to preserve and promote positive traditional Chinese culture. Modern Chinese intellectuals hoped to rely on their personal knowledge structure to participate in the international issue of calendar reform

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and build the modernity of Chinese culture on a global scale to overcome the cultural identity crisis that had plagued them for decades.

Compared to those professional calendar reformers with diplomas in mathematics, astronomy or astrophysics, Gao Mengdan integrated the worries about fading traditional knowledge into his calendar reform research, revealing his typicality among Chinese intellectuals. He mainly relied on the knowledge sources available in Shanghai's public knowledge market, containing periodicals and popular publications in both Chinese and English, for the modernization of traditional heritages. Time standardization movement in 1920s and 1930s had made a huge innovative improvement on specific calculating methods, and needed to achieve the further reform on basic time units like months or weeks. Gao Mengdan was the first researcher showing the concern over the harmony of diverse time units, with systematic monograph supporting his proposal. Above all, this paper selects Gao Mengdan and his week calendar as a typical case for global knowledge transmission between China and foreign countries.

European and American countries have a long history of using the Gregorian calendar, and their modern calendar reform movement was initiated earlier than in China. Therefore, European and American scholars held a dominant position on global calendar reforms. In the process of modern Chinese cultural transformation, the diverse knowledge and the broad global vision shaped by this knowledge have enabled intellectuals like Gao Mengdan to form a strong discourse consciousness of participating in international issues. Gao Mengdan was the first in China to advocate the Gregorian and week calendars. His calendar reform plan was submitted to the League of Nations, and he effectively voiced the representation of China's intellectuals on this issue. From another perspective, solutions to world issues require different countries to strengthen cooperation based on exchange and mutual learning. Modern Chinese intellectuals, such as Gao Mengdan, achieved research results that were both scientifically innovative and practically viable by engaging in calendar reform and effectively integrating new and old knowledge. This scientific and cultural practice built a more inclusive and open cultural modernity and also represented an important attempt by Chinese intellectuals to construct Chinese modernity on world issues. However, owing to the complexity of calendar reform, rulers of the Republic of China wavered between following old management patterns and accepting new knowledge. They accepted the foreign experience of the solar calendar but insisted on using conservative discourse as a theoretical weapon for propaganda ideology. Because of this tug-of-war relationship, the formation of a society which experienced "duality in calendar" was inevitable, which deepened the historical anxiety of Chinese modernity and shaped the image of Chinese intellectuals wandering between the old and the new.

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