

# Staff Notation or Numbered Music Notation That Is the Question: A Brief History of Numbered Music Notation and an Examination on Its Effectiveness of Music Learning

**Chia-Lun Chang**

College of Music and Dance, Baise University, Baise, Guangxi, China

DOI: 10.32629/asc.v3i4.1037

**Abstract:** The staff music notation was originated from Gregorian chants of medieval Europe. It became the universal standard notation although there were music notations found in other ancient cultures. During 19th century, a new and simplified notation system in which Arabic numbers were used to represent musical notes began to circulate among amateurish music learners all over the world. While this notation system, named numbered music notation (NMN) in this article, started to wane in other countries in the early 20th century, Chinese adopted it earnestly and continued to use it as a major practice in music printings and education. In the field of traditional Chinese music, some readily assume it is a Chinese invention. This article puts forward a discussion on the emergence of the NMN and its application in China, compares it with the staff music notation, and exams how notations affect music training.

**Keywords:** music notation, numbered music notation, graphic music notation, solfège, music education, cognitive process

## 1. Introduction

The origin of the numbered music notation (NMN) dated back to the 18th century when a Genevan philosopher and composer, Jean-Jacques Rousseau proposed a new notation system to the Academy of Science in Paris, but was rejected. To teach children with speech and hearing disabilities, Pierre Galin, a French mathematics teacher developed a numerical music notation that's similar to Rousseau's system. Galin's method was further organized and popularized by Aimé Paris and Emile Chev , and became the Galin-Paris-Chev  system. The numbered notation system uses Arabic numerals 1, 2, 3, 4, 5, 6, and 7 to represent solf ge Do, Re, Mi, Fa, Sol, La, Si, while 0 is designated for musical rests. Regardless the keys, the first degree is always a 1 or Do. For example, in D major, the staff notation is written on D-E-F#-G-A-B-C#-D, and the numbered notation is notated as 1-2-3-4-5-6-7-(a dot on top indicates an octave higher), while A natural minor scale is denoted as 6-7-1-2-3-4-5- (Figure 1).

Staff (graphic) notation		
Numbered music notation	1=D 1 2 3 4 5 6 7 $\dot{1}$	6=A 6 7 1 2 3 4 5 $\dot{6}$
Solf�ge	Do Re Mi Fa Sol La Si Do	La Si Do Re Mi Fa Sol La (A natural minor)

Figure 1. The numbered notation system

Zolt n Kod ly, the celebrated Hungarian music pedagogue employed and modified the Tonic Sol-fa system developed by a British minister, John Curwen. Tonic Sol-fa system has certain similarity to that of Galin-Paris Chev  method; they both allow the movable Do and they both developed to assist sight-singing. Instead of using letters to represent solmization as in Curwen's notation, Kod ly's method uses scale degree to designate notes of different key, subsequently, the first degree of the scale (notated as 1) in the key of G is sang Do instead of Sol. In fact, Kod ly's modification is closely related to Galin-Paris-Chev  method. These systems were popularized in Europe as well as America, particularly amongst singers and elementary level music education.

During Japan's Meiji Restoration (1868), Japan embarked a period of advancement and enlightenment. The reform eagerly embraced ideas and philosophy from the west and took education as the front runner. Ministry of Education and compulsory education system were established in Japan, and young students were sent to western countries to study for the purposes of teacher training. Music and singing were included in the curriculum of the compulsory education, and foreign

scholars and educators namely Luther Whiting Mason was recruited to bring western music and methods into Japan [1]. Before his appointment in Japan, Mason had already established his reputation as a music educator in the U.S. He systemized music curriculum and teaching methods for public schools and his National Music Course became the first graded series of music textbooks in the U.S. Mason adopted Chev  notation system and studied Curwen's Tonic Sol-fa method. In National Music Course, Mason used charts, ladders, letter names, solf ge syllables and numbers to assist note reading. Mason's National Music Course and his teacher's manual *The First National Teacher* were translated into Japanese, and his methods and song collections were incorporated in the first publication of Japanese school songbook *Shogaku Shokashu Shohen* (小学唱歌集初编) in 1881. The selected pages from *Shoga-shu* demonstrate Mason's ladder of scale and NMN (Figure 2). Though it is unknown whether the NMN was definitely introduced into Japan by Mason, it was certainly popularized by having it incorporated in the music textbooks of the public schools as early as 1881.

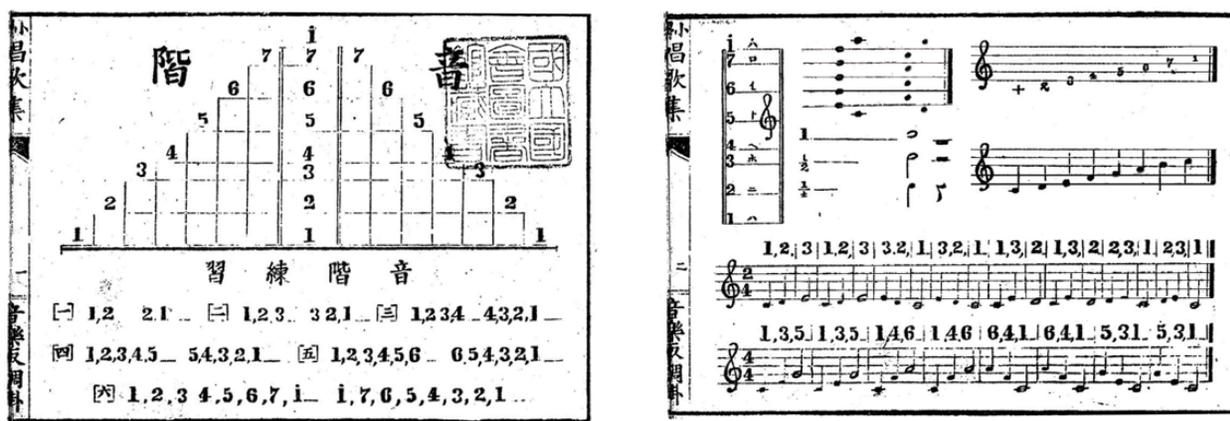


Figure 2. The introductory pages from *Shogaku Shokashu*

## 2. The introduction of western music and the numbered notation in china

Western music was introduced to China as early as Yuan Dynasty around 1300s by Christian missionary. Harpsichord brought by Italian Jesuit priest Matteo Ricci was gifted to the emperor of Ming dynasty in 1601. By 1670 in Qing Dynasty, bibles, psalm and Gregoria chants became available in Chinese and the notation of Gregoria chants found its way into China. In 1713, Qing emperor ordered a compilation of the music treatise *L l  Zhengyi* (律吕正義 The True Doctrine of the Pitches) [2]. It consists of three parts, *Zhengliu Shenyin* (正律審音 Examination of Pitch System), *Hesheng Dingyue* (和聲定樂 The Sound and Make of Music Instruments), and *Xiejun Duqu* (協均度曲 The Overall Unification of Musical Compositions-Elements of European Music). The last was written by Thom s Pereira (1645-1708) and Theodorico Pedrini (1671-1746) who were Christian missionaries working in the imperial court of Qing Kangxi Emperor. *Xiejun Duqu* is China's first music encyclopedia that explained western staff music notation, solmization and theory. While western music was played and enjoyed by the royal court of China, western music notation could only be seen in court or churches. The vernacular music of the commoners was largely unaffected. It was not until late Qing Dynasty, after China was defeated by Japan in the Sino Japanese War (1894-1895), Emperor Guangxu saw the success of Japanese Meiji Restoration and became aspired to bring modernization to China as it did to Japan by launching the Hundred Days Reform in 1898. During the reform, Emperor Guangxu abolished the imperial examinations and established public schools that imitated Japanese public education system, and in which the *Yuege* (樂歌 Musical Songs) was included as a school subject. The same Chev  notation system as well as most of the melodies of the songs were "borrowed" from Japan as the music materials for *Yuege*, the school singing class. Through school education, Chev  NMN system quickly replaced the character-based notation systems of traditional Chinese music, and assimilated locally among the people [3].

## 3. The adaptation, dissemination and rationale

From late 19th century to the first half of 20th century, China experienced a time of political and cultural turmoil. To ease the shame of defeat, some aspiring youth responded to the reform by going abroad to study and brought back China advanced techniques and knowledge. In music field, these students returned as classically trained musicians and led the nation's musical developments to different directions. While the complexity of harmonic system and contrapuntal texture of

western music requires a more advanced notation system such as the staff notation, traditional Chinese music, like the songs, is relatively monophonic and continued to use the NMN as a means of music education, dissemination and preservation.

An inspection on the historical development of Chinese music and its notation may shade some light to what caused Chinese music to accept and adapt NMN so quickly and thoroughly while other countries gradually abandoned this practice. Here it summarizes few factors which might contribute to such a phenomenon. First, before the introduction of western music and its methods, music dissemination and teaching were made mostly by word of mouth. Throughout history, Chinese had developed several different kinds of notation systems, such as Gongche notation, Gongshang notation, Jianzi notation and others. They are not absolute pitch notations but character-based that either indicate pitch names or performing techniques without a precise rhythmic system. Nevertheless, the character-notated music was rather complicated to decipher, and their methods were not widely distributed. Secondly, Chinese music was never developed as an independent art form that separates itself from other arts such as poetry, theater, dance, painting (nature), or even morality, hence music was always subordinate to words. Consequently, the individuality in compositional style and precision of music was largely neglected, instead the individuality of performing style became the nucleus of the aesthetic value and result in various performance versions of the same piece of music. Thirdly, although Chinese discovered the 12-tone system at the early time, music was mostly pentatonic in monophonic texture, and the pitch range was relatively limited. Even with ensembles, the harmonic function and tendency such as the dissonance and resolution were never emphasized. Chinese instead interested more at the nuance of the varied tone (half tone, quarter tone or something in-between) that might be produced to resonate with the speech or the rhythm of the environment. As a result, music sounds more "improvised" than "composed". The precision of notation in these cases was rather unattainable and expendable. The NMN fits perfectly with these characteristics of Chinese music as it is simple, flexible, and one dimensional.

#### 4. The problems of numbered music notation concerning music education

In retrospect, the creation and development of NMN system was for educational purposes, more specifically for singing or sight-singing. For Curwen, Mason or even Kodály's, numbers or abbreviations functioned as a mnemonic aid for pitch training which enable students to promptly solmizate musical notes. Mason's ladders helped students to conceptualized the high and low of the pitches, while Curwen and Kodály developed hand signs to accompany solfège syllables. The NMN was never meant to stand alone as a mainstream notation system for instrumental or ensemble music.

While the NMN might be the easiest and most convenient method to teach solfège, speedily jot down music, distribute and popularize a song, it posts some concerning problems for the music training in the "fine" art department. When students who learned to read NMN before learning staff notation, in many cases students would have issues in playing on the correct register and recognizing key change, accidentals, intervals, or chords. Even for singing, students could easily turn a blind eye to the direction of the pitches and sing a completely wrong tune without realizing it. And with its moveable Do practice, students would be trained to hear only one key which might cause the inability to recognize the movements or tensions between keys in a piece of music. These are due to the one-dimensional display of pitches on the NMN. Figure 3 shows the same music excerpt notated by NMN and staff notation. Even though both are notated on a grand staff, the vertical axis that displays pitches remains flat in the NMN music score. Granted that the chords are presented by a series of stacked numbers, their intervallic content and relationship cannot be observed and the melodic direction of high and low is entirely discarded.

(Guzhen score "Yizhu Dance" in numbered music notation) ("Yizhu Dance" in staff notation)

Figure 3. Comparison of NMN and staff notation

Though the reading proficiency of the staff notation takes longer time to acquire, the graphical staff notation system does contain several advantages that the NMN cannot achieve. The dual displays of time and pitches on horizontal and vertical axes in staff notation system train the brains to process multi-dimensional information. With it, the relation of time and space

could be visualized, and through visualization, the brain then convert the imaginary distance to a real physical distance and transmit directional information for physical movement to be placed on the instruments. The sound that is produced, either by playing on an instrument or singing adds another layer of information for the brain to register and establish the base for ear training. In language, the spatial adjectives such as high and low, up and down, parallel or contrary are used to describe sound and pitch movement. In addition, studies found that listening to music or playing music is a complex cognitive process in which activations were detected on both sides of the brain. Sergent *et al.* (1992a) found that when reading a musical score, the activation area found in the brain corresponds to the area that's responsible for visual spatial processing but not to the visual processing of words. Also, when tasks involve concurrence of reading, playing and listening, additional regions are called up to execute the motor performance in respond to the spatial information perceived from the location of the notes on the staff [4]. More studies need to be done to determine whether reading the NMN mutes the sensorimotor transformation process when learning and performing music. Nevertheless, it is definitive that the spatial association is established by visualization. When learning a piece of music from a score, the visualization of up and down, high and low, thin or thick, and tall or short helps the conceptualization of the sound and forms the guidance of motor activities.

## 5. Conclusion

Music literacy is indispensable for performing and understanding music as the alphabets or words are to a language. Despite the monophonic and narrow pitch range characteristics of traditional Chinese music, the new wave of Chinese music is no longer the case and is moving toward fusion of the East and the West. With the increase of tonal, harmonic, rhythmic and textural complexity, the NMN would be insufficient for new musical developments. More importantly, it minimizes the efficacy in developing musicianship. Without establishing the perception of space relation visually and physically, auditory sense becomes the only thing to rely on while learning a piece of music. Playing by ear is not necessarily a negative thing, in fact, it is one of the essential abilities for music professionals. However, not everyone owns this innate talent for music and the majority require training to establish music foundations. While the NMN has its limitation in representing all musical elements, the capacity of staff music notation is endless and it can withstand the test of time and challenges of different musical cultures.

## References

---

- [1] Eppstein, Ury. Musical Instruction in Meiji Education. A Study of Adaptation and Assimilation. *Monumenta Nipponica* (1985): 1-37.
- [2] Gong, Hong-Yu. Missionaries and the Beginnings of Western Music in China: The Catholic Prelude, 1294-1799. (2018)
- [3] Wang Runting. Exploration of Sound Sense. Taipei: Mainland Bookstore; 1999.
- [4] Sergent, Justine, et al. Distributed neural network underlying musical sight-reading and keyboard performance. *Science* 257.5066 (1992): 106-109.
- [5] Howe, Sondra Wieland. Luther Whiting Mason: Contributions to Music Education in Nineteenth Century America and Japan. University of Minnesota, 1988.
- [6] Shi-guang, Cui. Three Centuries of Cultural Interfacing: A History of Western Music in China. *The American Music Teacher* 39.5 (1990):14.