

Principles of Fingering Sequence Construction Based on Chinese Bamboo Flute Fingering Logic

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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v13-i11/19648> DOI:10.6007/IJARBSS/v13-i11/19648

Published Date: 30 November, 2023

Abstract

After the Chinese bamboo flute entered the 20th century, it gradually moved from traditional education to school education. This led to a complete shift away from the oral mode of teaching the Chinese bamboo flute. At the same time, the focus on the music of the bamboo flute was not solely immersed in training and performance. However, the current theoretical development of the Chinese bamboo flute lags behind the overall development of Chinese musicological theory, most notably in the lack of analytical approaches to bamboo flute music. Most researchers are still using Western composition theory to try to analyse the morphology and characteristics of Chinese bamboo flute music, leading to a perception that is increasingly deviating from the logic of the bamboo flute itself. This study attempts to establish a fingering sequence from the single perspective of bamboo flute fingering, which can be used as an alternative to existing notation to provide a rational and sustainable description of bamboo flute music. This research focuses on the construction of bamboo flute fingering sequence theory, the determination of different fingering (inverse) mark according to the movement logic of bamboo flute fingering, and the development of preliminary ideas for subsequent research.

Keywords: Chinese Bamboo Flute, Fingering Mark, Fingering Sequence, Fingering Logic, Music Analysis

Introduction

Records of the history of the Chinese bamboo flute date back 8,000 years to the bone flute (Zheng, 2008). Throughout the history of the Chinese bamboo flute, its shape has been constantly changing, which led to its name, musical temperament and method of playing varying from dynasty to dynasty in ancient China (Xiao, 2013). It was not until modern times that the Chinese bamboo flute was unified in its shape. Although there were a few attempts to improve and upgrade it, they did not spread. Even so, the nature of the Chinese bamboo flute has never changed. The bamboo flute is popular among the folk and can be found at

different occasions, festivals and celebrations. Also, the bamboo flute is an essential instrument in various traditional bands.

Oral teaching is a distinctive feature of the teaching of traditional Chinese instruments. The traditional mode of teaching the bamboo flute is no different from this (Lin, 2009). This oral mode of teaching can lead to students having an absolutely emotional understanding of music, further resulting in their focus being entirely on training and practice. However, as the twentieth century progressed, Chinese bamboo flute teaching was influenced by Western musical thought and gradually transitioned from a folk to an academic attribute. As a result, the rational mode of teaching began to provoke a relevant consideration of the bamboo flute.

Against the backdrop of the flourishing musicological theory in China, Wang (2017) points out that the theoretical level of the Chinese bamboo flute is relatively backward. He does not specify what the corresponding theory needs to be developed, but he does mention the concept of a 'technical mother tongue'. In another article by Wang, he argues that the 'technical mother tongue' is 'the way of playing and technical skills that have been accumulated over a long period of time by the practice of each instrument and that are generated and echoed by the relatively stable national musical style and aesthetic psychology' (Wang, 2016). It is easy to understand why Wang thinks that Chinese bamboo flute theory is backward. This is because, many researchers have not based their research on the bamboo flute on the discourse of the bamboo flute itself. Currently, Chinese music researchers are following Western composition theory to analyse the bamboo flute's performance techniques (Zhang, 2022). This approach is not only singular, but also devoid of any distinctive features.

At the current time, research into the bamboo flute is roughly classified into three categories: performance skills, culture (including aesthetics, history, etc.), and Musical instrument making. "Performance skills" refers mainly to the study of bamboo flute performance, or the study of methods of teaching technique, or the analysis of the influence of skill on musical performance, or the analysis and summary of a player's playing style. "Culture" refers mainly to the study of the historical documentation, formal variations and aesthetic characteristics of the bamboo flute. "Musical instrument making" refers mainly to the study of the flute making process.

Of these three types of study, the study of the playing techniques of the bamboo flute is undoubtedly the most numerous. However, most bamboo flute players always fall into a misunderstanding when studying playing techniques, especially when analysing the relationship between the morphology of bamboo flute music and the way it is played. They mistakenly thought that they could explain the logic of bamboo flute music using Western compositional analysis. However, the results of their analysis only remained in the field of composition and did not consider and analyse the bamboo flute from the perspective of the flute itself. Why are there different musical forms for the same theme on the bamboo flute? Why are there formulaic playing techniques within the same musical morphology? Why do bamboo flutes and other instruments (erhu, piano, violin, etc.) produce different results when playing the same melody? Why is the Chinese bamboo flute, which is almost identical in structure, completely different from the Malaysian seruling in terms of musical expression? None of these fundamental questions have been discussed and they are simply attributed to the influence of the cultural environment (Wang, 2014; Pan, 2022; Shi, 2022). However, this explanation is not good enough to explain the basic problem. Of course, the environment does influence human thought and behaviour (Taine, 2012), which in turn leads to certain specific habits of thought and behaviour. This is why we take it for granted that musical morphology is influenced by the environment. It is clear that scholars who study the Chinese

bamboo flute lack a specialised method or way of analysis. They rely too much on Western compositional analyses.

The focus of this study is to construct a specialised method of analysis from the instrument's own body. Excluding the influence of Western compositional techniques on the musical composition of the bamboo flute, "breath (气)", "finger (指)", and "tongue (舌)" are three important elements in bamboo flute performance. Among these three elements, "finger" is the one that can be directly observed and is also the most convenient for data processing. According to Blacking (1995) and Baily (1995) on butembo flute and dutar, there is a natural relationship between melody and fingering sequence, and Baily, through a series of comparisons, found a left-handed fingering sequence pattern in dutar. In addition, Humet (2007), when composing for the Japanese shakuhachi, had a similar understanding that the melody and morphology of the music needed to conform to the patterns of finger movements of the player as he or she played away on the shakuhachi. Therefore, all three of them believe that there is a deep connection between the musical morphology, the instrument and the finger movements, whether it is observed objectively or composed subjectively. From this it can be seen that the musical morphology is the acoustic embodiment of the fingers' movement, and the movement of the fingers can be seen as a response to the musical melody by the behaviour.

Therefore, in order to find an analytical method that matches the music of the bamboo flute, this study will attempt to discover the fingering logic of the bamboo flute from the point of view of its fingering. Currently in China, research in this field is still in a blank stage, and no scholar or individual has conducted a systematic study on the fingering of the bamboo flute, which is more of an experiential explanation. This kind of elaboration has led to a kind of uncertainty, for example, in the discussion of half-hole fingering, many different views and opinions have appeared (Qu, 1993; Fang, 1999; Cao, 2022; Xu, 2023). However, it is also possible to understand from these uncertainties that certain bamboo flute fingerings do differ from person to person in actual performance. Of course, the variation is in the trajectory of the finger in the air between the time the finger leaves the hole and the time it is pressed into the hole. What is certain is that the final state of the fingers is the same for each note, i.e. the number of finger holes opened and closed. Therefore, this research is to discuss the principle of constructing bamboo flute fingering sequences from the defined element of bamboo flute fingering, to explore a new path for the analysis method of Chinese bamboo flute music, and to fill the gap in the systematic study of Chinese bamboo flute fingering. At the same time, this study is a response to the construction of the thinking of Chinese national musical instrument fingering (Xiao & Li, 2020), as well as the practice of returning to the Chinese bamboo flute's mother tongue technique (母语技法) (Wang, 2017).

Literature Review

In China, the term "fingering sequence" first appeared in the erhu¹, introduced by Song (1982). He defined the fingering sequence as a combination of fingers (four fingers of the left hand and open strings) to play the erhu, mainly two to four fingers. Finished, there are a total of 60 combinations. On this basis, Guo (2019) first summarized Song's theory of erhu's fingering sequence and listed 60 orchestras according to Song's theory of fingering sequence. She then named the fingering sequence proposed by Song as the basic fingering sequence and developed the phonological fingering sequence, the transposition fingering sequence,

¹ A Chinese stringed instrument.

and the combinatorial fingering sequence. However, the research of the Song and Guo is only basic research, and even the last two fingering sequences theories developed by Guo based on compositional techniques in development only detail the basic patterns of finger combinations in Erhu's performance. Song and Guo were perhaps influenced by Liu Dehai's etudes, so the discussion of fingering order was based on the unit rhythm, ignoring that the fingers were always moving during the performance of the piece.

In Guzheng²'s music theory there is also a concept of "fingering sequence", which was first introduced by Zhao (2001). Although he lists several patterns of finger movement when touching the guzheng in his book, he does not give a detailed definition of the sequence of the fingering. However, from his description it follows that he understood the sequence of the marks in the same way as Song.

In bamboo flute music theory, the concept of "sequence" is clearly not taken seriously. Li (2016) mentions fingering sequence in his study of bamboo flute music, but equates the concept of "fingering sequence" with "fingering". He simply believed that the "sequence of fingering" was the fingering of a sound, the same concept of "fingering" in real teaching. And Xie (2014) also used the concept of fingering sequences in her thesis. While it does not confuse the concept of "fingering sequence" with that of "fingering", it only vaguely explains the concept of "fingering sequence" and makes no reference to "fingering sequence". To define it, it can only be understood as a form of movement of the fingers. The understanding of Xie's "fingering sequence" is by Xu (2011). Xu was one of the first to use the concept of fingering sequence in bamboo flute studies, and like others, he did not define the term. It is even more regrettable that Xu only used the term on the cover of his book, while the content of the book no longer refers to this concept. Perhaps Xu also confused "fingering sequence" with "fingering" and even "technique".

Methodology

Research Design

This study will quantify the fingering of the bamboo flute, converting what would otherwise be unprocessable fingering into processable data.

The way to quantify the fingering sequence has been suggested as a pedagogical idea by Song (1982) in the art of playing Erhu. He considered the sequence of fingering as a combination of arrangements between the four fingers of the left hand and the open strings of the Erhu, which is the basis for students to practice the Erhu. Although Song did not develop a theory of fingering sequence, he listed three basic forms of combination separately. This combinatorial form is an intrinsic mathematical principle (Chen, 2009). According to the fingering sequence theory proposed by Song, the fingering sequence is the order of the left hand fingers on the strings when playing the Erhu. He marked the index, middle, ring, and little fingers of his left hand as 1, 2, 3, and 4, respectively. In fact, Erhu's open string was also used as a finger in his theory, but he did not mark it. This is probably why Xie (2019) considers only four fingers of the left hand two and not the open strings in her thesis. Therefore, to explain Song's fingering sequence theory, the Erhu open strings would be marked as 0. According to the statistics of the results of Song's theory of fingering sequences, there are a total of two hundred combinations of fingering sequences for the Erhu.







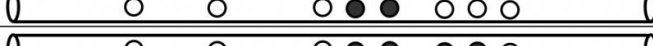
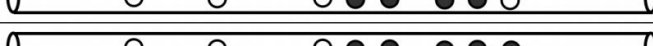

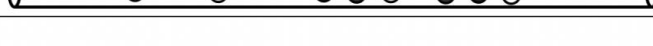
Unlike the fingering logic of Erhu, in the bamboo flute, a finger corresponds to a finger hole (Figure 2). The relationship is fixed and absolute. However, this situation of a finger to a

² A Chinese plucked musical instrument.

finger hole does not exist in erhu. Therefore, the fingering sequence of the bamboo flute in this study does not focus on various combinations of arrangements, but on the number of open and closed holes.

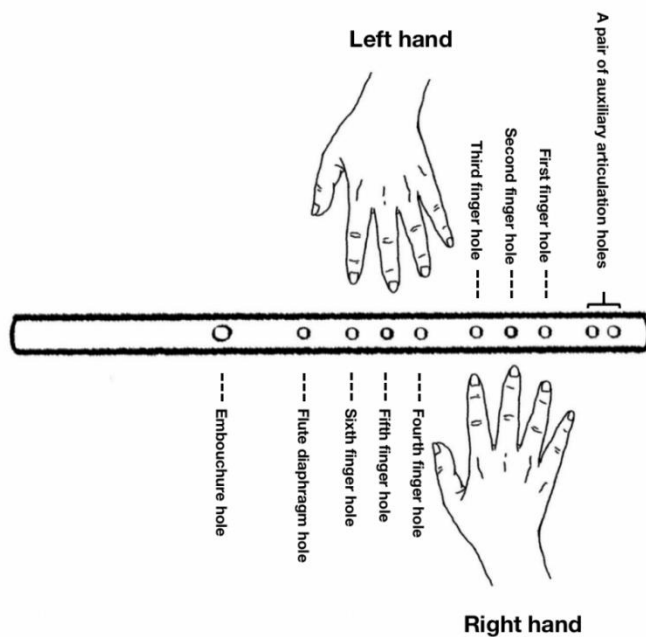
As the essence of bamboo flute fingering is a finger movement or an act of supporting sound, the description of bamboo flute fingering currently relies on diagrams (Figure 1). Beginners memorise the fingering of each note and then link them together in the piece. No piece of music has the diagram of each note marked on the score, which would make it particularly long. In practice, beginners simply relate the notes in the score to each fingering in the fingering chart. However, when we look at the musical score, we only observe the height and tendency of the notes, the rise and fall of the melodic line, etc., but not the track and course of the finger movements.

Figure 1
All Pressed as Sol Fingering Chart

Pitch	Fingering
5̇	
6̇	
7̇	
1/1̇	
2/2̇	
3/3̇	
4̇	
4̇	
5̇	
6̇	

If an attempt is to be made to convert fingering diagrams into another form, i.e. data that can be observed, then the fingering of the bamboo flute needs to be quantified according to certain rules of its own.

The first step is to divide the arrangement of the bamboo flute's finger holes for better observation and quantification. The bamboo flute has six finger holes (Figure 2), which are controlled by the index, middle and ring fingers of the left and right hand respectively.

Figure 2*Distribution and Description of The Finger Holes of The Bamboo Flute*

In practice, however, the movement of the two hands is almost inconsistent. Sometimes it may be that the left hand is at rest and the fingers of the right hand are in motion (Figure 3a); sometimes it may be that the right hand is at rest and the fingers of the left hand are in motion (Figure 3b). Sometimes, of course, the fingers of both hands may be in motion at the same time. It is the status of the two hands at this time that is unified. The static status is the exact opposite of what is actually happening for the two hands. When the left hand is at rest, all three fingers of the left hand are pressed against the finger holes. When the right hand is at rest, all three fingers of the right hand are away from the finger holes. This phenomenon is due to the structure of the bamboo flute. The airflow we blow will first pass through the left-hand controlled area, when there is not enough airflow in the right-hand controlled area to support it, so the right hand cannot engage. It is only when the left hand controlled area is completely closed that the airflow can be extended for the right hand controlled area to play. So, from this point of view, the six finger holes of the bamboo flute are actually divided into two areas. It is customary to name the fingerholes of a bamboo flute as the first fingerhole near the end of the flute and the sixth fingerhole near the membrane (Xu, 2003). The area containing the first, second and third fingerholes are therefore named the lower fingers position, while the areas containing the fourth, fifth and sixth fingerholes are named the upper fingers position (Figure 2).

Figure 3a
Left Hand at Rest

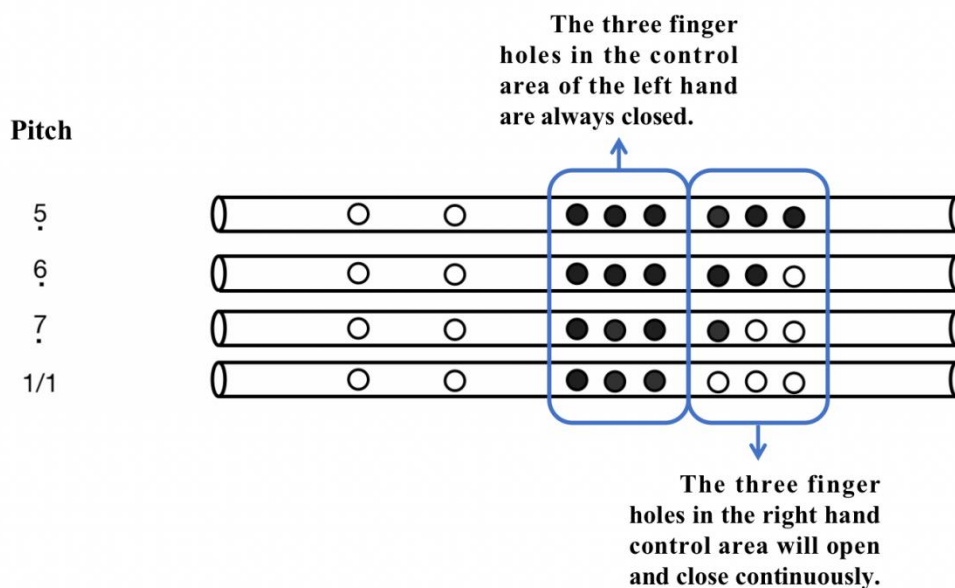
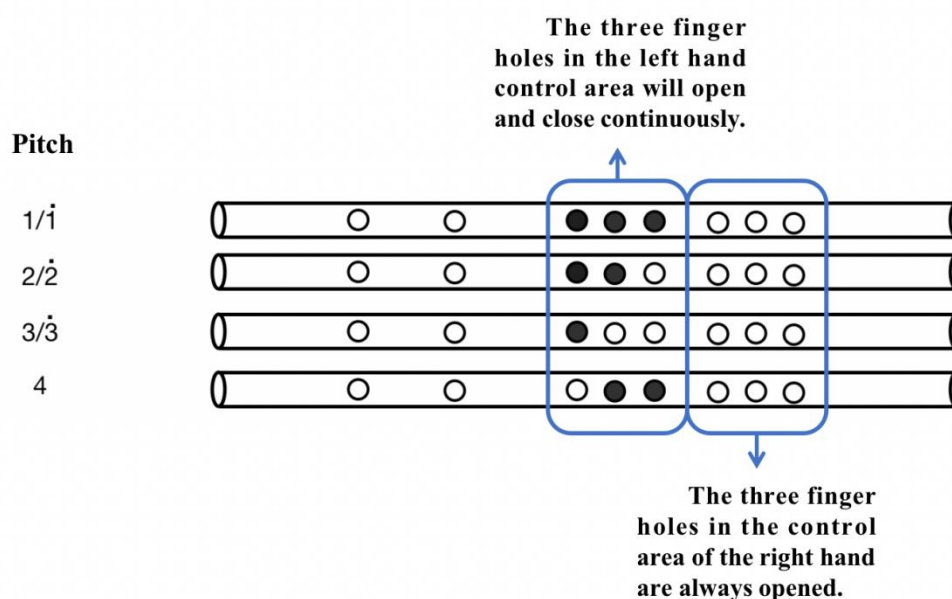


Figure 3b
Right Hand at Rest



Next, there are the principles that make up the fingering sequence of the bamboo flute. The number of opened and closed fingerholes is an important and unique reference for describing the fingering sequence. By dividing the fingerholes area of the bamboo flute, only three fingerholes exist in the upper and lower finger positions. It is therefore only necessary to observe the two finger positions according to the "all pressed as Sol" fingering chart. In this process, two important sets of concepts are developed to describe fingering sequences: single and compound fingers position; fingering mark and fingering inverse mark.

The single fingers position and the compound fingers position are descriptions of the degree of involvement of both hands in the playing process. According to the illustration of the division of the fingerhole areas, there are two states of unified and disunified movement of the two hands when playing the bamboo flute. In the state of non-uniform movement, the single finger position is used to describe it; in the state of uniform movement, the compound finger position is used. For ease of notation, U (number) and L (number) indicate the upper and lower fingers positions respectively in the single finger position, such as U (1) and L (2). U (number) L then indicates a compound fingers position, meaning that in this type of marking both hands are involved in the movement at the same time, as in U $[\begin{smallmatrix} 1 \\ 1 \end{smallmatrix}]$ L.

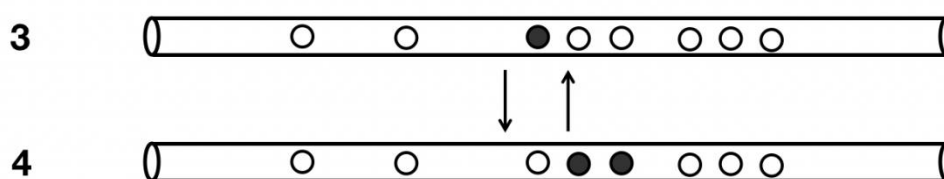
The fingering mark and inverse mark are essentially the number of open and closed finger holes of the bamboo flute. In each fingers position there are two states of movement: opened and closed. The ○ and ● in Figure 1 represent these two states. As the opening and closing of the finger holes is a complementary relationship, it is not possible to describe them from both states at the same time. Therefore, in this study, fingerholes opened is specified as the mark and fingerholes closed as the inverse mark. It was mentioned earlier that there is a complementary relationship between mark and inverse mark. This is mainly because the number of finger holes in each fingers position is constant at three. However, there is an exception. In the upper fingering position, the pitch 4³ has a different fingering (inverse) mark than the other pitches.

Figure 4 shows the movement between pitch 3 and pitch 4. As the fingering of pitch 4 is a forked fingering, the middle finger and ring finger of the left hand will act as a whole during the finger movement. The number relationship between the index finger of the left hand and the middle and ring fingers as a whole will therefore be 2. Therefore, the absolute value between the base and the inverse base of the fingering sequence for pitch 4 will be 2, not 3.

Figure 4

Movement Between Pitch 3 and Pitch 4

Pitch



The compound fingers position is when the upper and lower fingers positions are together involved in the playing of certain pitches, most obviously when both upper and lower fingers positions are not in the static status. The fingering of the pitch 4, pitch 5/5 and pitch 6 in Figure 1 is a compound fingers position.

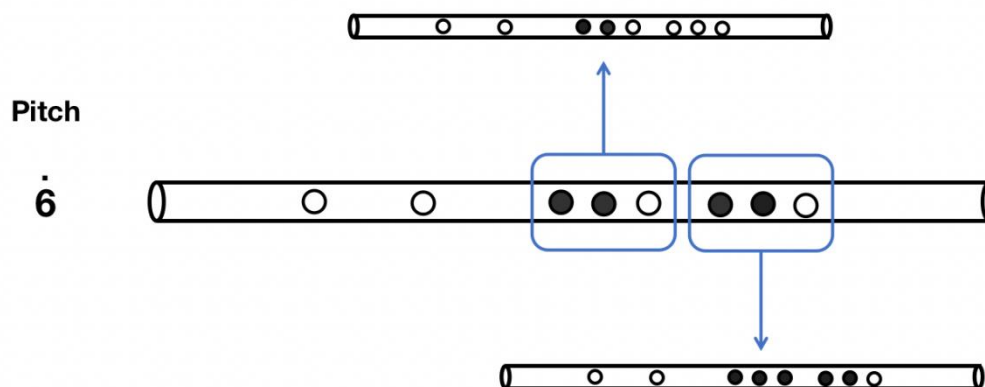
The composition of the compound fingers position is based on the single finger position, i.e. the fingering marks of the upper and lower finger positions are combined. For example, the mark of the fingering for pitch is U $[\begin{smallmatrix} 1 \\ 1 \end{smallmatrix}]$ L. If observed for the fingering of pitch 6 (Figure 5), the mark of the fingering for the upper fingers position is U (1) and the fingering mark for the lower fingers position is L (1). Following the principle that the expression of the fingering mark

³ Pitch 4 is restricted to fingering with all pressed as Sol.

of the compound fingers position has the upper finger position base on top and the lower finger position base on the bottom, the fingering marks of the pitch 6 can be combined.

Figure 5

Marks Composition of The Fingering for Pitch 6



Research Limitations

First of all, the choice of bamboo flute shape and fingering needs to be limited. As there are different bamboo flute shapes and a variety of fingerings, only six-hole bamboo flutes are considered at the initial stage of this study, based on the popularity of bamboo flute shapes in China and the ease of fingering. There are seven types of fingering⁴ for the bamboo flute. According to the order of fingerings learning, this study will start with the "all pressed as Sol" fingering. After that, the "all pressed as Sol" fingering will be used as a reference point to expand to other fingerings. Also, for the ease of the instructions that follow, the playing position in this study is with the end of the flute towards the right.

At this stage of the study, the fingering marks arise from the number of open finger holes in the fingerings corresponding to each pitch in the "all pressed as Sol" fingering, which is unique. However, the discussion is limited to the present stage. In practice, there are some pitches that show diversity in different fingerings. For example, in the fingering "all pressed as Re", there are two basic fingerings and one optional fingering for pitch 1. In this case, then, the fingering sequence is not derived solely from the musical score (or the text), but rather from observation and interviews with the player to determine the fingering markings for a particular pitch. However, there are not many such pitches that need to be operated in this way. For the experienced researcher, it is entirely possible to rely on listening to recordings to determine the fingering of these particular pitches.

Result

In accordance with the instructions in the research designs, a table was developed to convert the "all pressed as Sol" fingering chart (Figure 1) into a fingering (inverse) marks table (Table 1). The purpose of this is to explain the logic of bamboo flute music and related phenomena from the point of view of fingering thinking.

⁴ All pressed as Sol; all pressed as Re; all pressed as Do; all pressed as Mi; all pressed as La; all pressed as Fa; all pressed as Si.

Table 1

Fingering (Inverse) Marks Table: All Pressed as Sol

Fingers position Items	Single finger position								Compound finger position		
	Upper finger position (U)				Lower finger position (L)						
Pitch	1/1	2/2	3/3	4	5	6/6	7/7	1/1	5/5	4	6
Fingering marks	U (0)	U (1)	U (2)	U (- 1)	L (0)	L (1)	L (2)	L (3)	U[-1]L 0	U[-1]L 1	U[1]L 1
Fingering inverse marks	U (- 3)	U (- 2)	U (- 1)	U (1)	L (- 3)	L (- 2)	L (- 1)	L (- 0)	U[1 -3]L	U[1 -2]L	U[-2 -2]L

The initial purpose of constructing a fingering mark for the bamboo flute was to record and observe bamboo flute music in an alternative form. The fingering mark does not replace the existing notation function, nor was it constructed to replace some existing way of recording. At present, the study of bamboo flute music is only analysed from the point of view of composition, losing the understanding of the logic of the bamboo flute itself. This has been illustrated by several issues raised previously. The construction of a fingering mark can only explain in a basic way a part of the bamboo flute's own logic, i.e. fingering thinking.

When trying to understand an octave, a piano student would open the palm of his hand and measure and interpret the octave with the distance between his thumb and little finger, and this distance would correspond to the distance in the stave. But in the bamboo flute, whatever the notation, the understanding of an octave is not related to the distance, but to the speed of the air flow (which is not the subject of this study). Sometimes, in the actual movement of the fingers, blowing an octave may not require moving the fingers at all. For example, the mark of the fingering for pitch 1 and pitch 1 is the same, both being U(0)/L(3).

The reason why mainstream notation cannot fully explain the logic of the movement of the instrument is that notation is a means in the field of composition and is not designed according to fingering thinking. Whether in stave or numbered musical notation, it is an expression of pitch thinking. Although notation for the bamboo flute is usually in numbered musical notation and numbered musical notation is more appropriate for the bamboo flute, some researchers convert the numbered musical notation into stave before conducting research on bamboo flute music (Xu, 2022). Alternatively, they may switch to using the stave for teaching (Zhang, 2010). None of these will change the status quo.

The principles of fingering mark construction are similar to those of stave and numbered musical notation, i.e. there is a one-to-one correspondence between marks and pitches. Perhaps the only thing that needs to be discussed is the mark of the fingering for pitch 1/1. This is because there are two sets of marks for pitch 1/1: U (0) & L (3). The trend of the melody is the criterion that distinguishes between these two groups of marks. The trend of the melody determines in which finger position the next finger movement is to be made. In Example 1a, the melodic trend is upward, so the mark for Pitch 1 is marked U(0). In Example 1b, the melody has an upward trend, so the mark of Pitch 1 is marked L(3). However, in melodies with a more

complex trend, the mark of pitch 1 in example 2a is U(0) and the mark of pitch 1 in example 2b is L(3). In fact, the mark of pitch 1/1 is determined by the next pitch. Therefore, the fingers position where the next pitch is located is the fingers position of pitch 1/1.

Example 1a

$\frac{4}{4}$ 1 2 3 2 | 3 - - - |

Example 1b

$\frac{4}{4}$ 1 7̣ 6̣ 5̣ | 6̣ - - - |

Example 2a

$\frac{4}{4}$ 1 6̣ 5̣ 2 | 3 - - - |

Example 2b

$\frac{4}{4}$ 1 3 2 5̣ | 6̣ - - - |

The current construction of a fingering mark for the bamboo flute enables a preliminary transformation from pitch notation to fingers movement of bamboo flute music. To initiate new thinking about bamboo flute music from the point of view of fingering thinking and to explore a matching method of analysis.

Discussion

The fingering sequence of the bamboo flute is the recording and description of the finger movements during the playing of the bamboo flute. In order to capture and summarise the fingering thinking of the bamboo flute, the fingering mark is recorded instead of the note markers. The presentation of the fingering sequence is not instructional in any sense. The fingering sequence only serves as an illustration of the melody in the form of a sequence, i.e. how the fingers move in a certain melodic section.

Figure 6 is a very simple bamboo flute piece that is used by beginners to familiarise themselves with fingering. By converting this piece, the fingering sequence for this piece can be obtained (Table 2). Before the analysis, a few notes are needed.

Figure 6

Grassland Round Dance

草原圆舞曲

1= C $\frac{3}{4}$

6̣ - 3 | 2 - 1 2 | 3 - - | 3 - - | 3 - 2 3 | 1 - 6̣ 1 | 6̣ - - | 6̣ - - |

||: 6̣ 3 3 | 2 3 3 | 1 2 2 | 3 2 2 :||: 1 - 2 3 | 2 - 1 | 6̣ - - | 6̣ - - :||

Table 2

The Fingering Sequence of Grassland Round Dance

U	[0	2	1	0	1	2	1	2	0	0	2	1	2	0	1	2	1	0	1	2	1	0]	L
		1	3							3	1	3	1	3						3	1				

First of all, the $U(1^0)L$ at the beginning of the sequence is not a mark of the compound fingers position, but two numbers with independent meanings; $L(1)$ is for pitch 6̣, and $U(0)$ is for ready. As previously explained and understood, the $U(0)$ is not necessary to be written out. However, in the process of pitch 6̣ → pitch 2, a finger position shift takes place. When the finger position is transferred to the upper finger position, the finger in the upper finger position needs to go from a static state to a state of movement immediately. Therefore, the $U(0)$ at the beginning of the sequence actually indicates the static state and is also the preparation before the upper finger position is ready to move.

Secondly, the second set of marks in the fingering sequence, $U(2^2)L$, also needs to be explained. $U(2)$ is the mark of pitch 3; $L(3)$ does not indicate a specific pitch, but rather that the lower fingers position moves from a state of motion to a state of rest during the fingering transition. This is because there is no movement of the lower finger position in the subsequent 6 sets of the marks.

Thirdly, the ninth set of marks in this fingering sequence, $U(0^0)L$, has the opposite meaning to the first set of marks: $U(0)$ indicates pitch 1, while $L(3)$ indicates that the lower fingers position is about to move from a static state to a state of motion. After all, $U(0)$ and $L(3)$, in addition to representing specific pitches, also indicate the static state of the upper and lower fingers positions.

In this piece (Figure 6), there are 30^5 notes. According to the count of the number of marks in the fingering sequence, there are 25 sets of marks, i.e. the number of finger movements, in this piece. The intention of the composer of this piece was to train and reinforce the beginner in playing the pitch 6̣. In terms of the scope of application of the piece, the fingering sequence is mainly concentrated in the upper fingers position and the density of marks in the upper fingers position is also more intensive than in the lower fingers position. In the sequence of learning bamboo flute fingering, the learner is exposed to and learns the

⁵ Not counting repeated marks.

upper fingers position in preference to the lower fingers position. By looking at this fingering sequence, the mark of the lower fingers position appears at the beginning, middle and end respectively, and only alternates between L(1) and L(3). Therefore, the scope and relevance of this piece is appropriate for training.

Conclusion

The fingering sequence of the bamboo flute is a recording and description of the music of the bamboo flute from the point of view of the movements of the fingers during the performance of the piece. This movement is universal in the language of all musical instruments and it also exists objectively. At present, no one has systematically studied the theory of fingering sequences for the bamboo flute. Xie (2014) has roughly proposed the concept of fingering sequences, but her understanding is unclear and remains in the sense of musical training. However, in the study of fingering sequences in the erhu, both Song (1982) and Guo (2019) have proposed studies of fingering sequences in the true sense. Probably due to its age, Song's theory on the fingering sequences of the erhu was merely a proposal of relevant theories without any data. Guo, on the other hand, inherited Song's theory and added her own new theory, presenting it for the first time in the form of a sequence. Unfortunately, however, Song's and Guo's theories do not fully describe the track of the finger movements throughout a piece of music and are limited to a description of a single unit. The fingering sequence for the bamboo flute makes up for this deficiency by allowing a complete description of a bamboo flute piece through the mark of the fingering, although at present the fingering mark is only "all pressed as Sol".

In addition, the fingering sequence of the bamboo flute is not a substitute for existing notation, it does not represent a melody or a specific pitch. The fingering sequence is merely a record of the finger movements. The purpose of this theory is to analyse the fingering thinking of the bamboo flute within the tracks of finger movements.

Fingering sequences are a theory that needs to be explored in depth. Chinese bamboo flute music has always taken external factors as the object of observation and analysis, while neglecting to look at its own internal aspects. The theory of bamboo flute fingering sequences is therefore based on the idea of exploring the internal instrumental language of the bamboo flute and also proposing a new analytical method for the analysis of Chinese bamboo flute music based on the language of its own instrument.

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