Analysis of Technique Evolution and Aesthetic Value Realization Path in Piano Performance Based on Musical Hearing

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Abstract

Piano performance technique evolution not only reflects players’ music level, but is also a basic way to show its different aesthetic values. Through the evolution in the late Baroque, Classical period, Romantic period and other stages, the fundamentality, practicality and musicality of piano performance techniques have all been innovated; therefore, music hearing should be employed to further improve them so as to express the players’ intuitive feelings. This paper, based on rhythms, musical hearing and internal presentation, attempts to construct a model using mathematical knowledge and discusses the results with the evaluation criteria.

Keywords: Musical Hearing, Piano Performance, Technique Evolution, Aesthetic Value, Realization Path.

1. INTRODUCTION

Piano art is full of aesthetic ideas. It is one of the ways to present national culture, thoughts and emotions. After experiencing historical changes, piano performance techniques are gradually improving. Now players are able to express different moods through piano music, reflecting the unique aesthetic value of piano art. Therefore, players need to start from the music itself, try to understand phrases and rhythms using the dialectical method through mathematical modeling and enhance musical hearing training using the trinity perception model to strengthen their performing techniques and fully reflect the aesthetic value of music.

2. LITERATURE OVERVIEW

In recent years, there have been a lot of studies on the piano technique evolution and aesthetic value realization path, but few has carried out analysis in combination with musical hearing. Shen (2003) studied high- and low-pitch piano performance methods based on piano performance evolution and musical hearing (Shen, 2003). Wang (2010) focused on the piano performance techniques in different periods of time and proposed the guiding roles of different performance styles and his performance style tends to have a strong personality (Wang, 2010). Wang (2016) mainly analyzed the evolution of piano techniques, and found out that there had been remarkable development in piano art in its long history, and put forward the different expressions of vibrato in different periods, which was an important contribution to piano techniques (Wang, 2016). Kang Qin and Du Xuan (2016) also carried out a study on the manifestation of aesthetic value in piano performance in the same year. They pointed out that the artistic and aesthetic values of piano performance played an important role in piano performance and should be realized to show the ontological and structural characteristics of the music. At the same time, the two also analyzed the relationship between artistic and aesthetic values and piano performance techniques and proposed the internal aesthetic values of music works (Kang and Du, 2016). Dong (2016) carried out research based on the piano technique evolution in the Romantic period and its improvement strategies and pointed out that players’ finger, arm and wrist trainings are all very important and that only through long-term training can players perform wonderful music (Dong, 2016).

3. THEORETICAL BASIS – HEARING AND MUSICAL HEARING

Hearing is one of the main senses of a person. It helps people distinguish the characteristics of sounds and produce reaction and intuitions towards different music modules in the music so that people can truly appreciate it. This ability was gradually formed and developed over different periods of history. From the music point of view, people’s sense of music is a perception of music works, mainly focusing on perception, memory, imagination and so on. Music exists in people’s lives mainly because of people’s dependence on their sense of hearing. The impression that the sense of hearing leaves in people’s mind is a whole and the perception of music
should also be within the range acceptable to people; in other words, as long as people can hear, they can enjoy music, and the only difference is that they enjoy it in different ways. But there is still a difference between musical hearing and hearing. In the application and training of musical hearing in the contemporary time, musical hearing is mostly understood in the broad sense. For pianists, musical hearing is very important. In fact, no matter what musical instrument is played, performers should all follow the logic law of music. Compared with hearing, musical hearing is a special ability, which can perceive and judge the pitch, beat and melody, and finally make music become an aesthetic conception based on musical hearing. Table 1 shows the method and purpose of musical hearing training.

**Table 1** Methods and purposes of music aural training

<table>
<thead>
<tr>
<th>Training method</th>
<th>Training goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous four, five degrees</td>
<td>Destroy the function system in three major and minor chords as standard and three degree superimposed chord consciousness, in order to remove the tonality</td>
</tr>
<tr>
<td>For more than three consecutive seconds</td>
<td>A whole syllable form, breaking the traditional size adjustable pitch tendency in the sense of</td>
</tr>
<tr>
<td>Continuous two, three magnanimous carry on</td>
<td>The shifting of tonality</td>
</tr>
<tr>
<td>Small six degrees, small three degrees and big six degrees</td>
<td>Break the traditional harmonies to give six-degree chord meaning, and the traditional inertia when the interval is shifted</td>
</tr>
<tr>
<td>A change of homophone level response size of three degree and five of the four pure pure</td>
<td>The tonality becomes blurred</td>
</tr>
<tr>
<td>The size of the size of seven degrees, nine degrees, tri tone training etc.</td>
<td>Master the combination exercises of modern music</td>
</tr>
</tbody>
</table>

### 4. EVOLUTION OF PIANO PERFORMANCE TECHNIQUES

#### 4.1 Late Baroque period

Piano became a solo instrument, and thus piano performance techniques were greatly influenced. Bach was the most influential musician in the Baroque period. In the Late Baroque period, a piano performance technique school led by Bach was formed, where most musicians completed their musical performance by slight finger movements in a relaxed state. At the same time, Bach also innovated performance techniques – they did not only use the three fingers in the middle, but also used thumbs and little fingers when playing the piano. Over time, the roles and use frequencies of thumbs and little fingers have been significantly improved, which has thus enriched the piano research skills and laid a foundation for modern piano performance techniques (Zhang, 2014).

#### 4.2 Classical period

In the Classical period, i.e. the second half of the 18th century, piano was being more and more widely applied and gradually replacing the traditional keyboard instruments. With the development of the times and the advancement of technologies, many types of pianoshave also been gradually derived, mainly represented by Vienna pianos and London pianos. Mozart and Beethoven were the main contributors to the formation of piano techniques during this period. Mozart played the piano in a light, pure and clear fashion without any extra body movements and his music was pure and elegant. He was a pianist in the transition of key touching skills in piano performance. On the other hand, Beethoven played the piano in an emotional and free way, with more body movements than Mozart’s, which had a lot to do with Beethoven’s life background.

#### 4.3 Romantic period

The piano performance techniques were matured in the Romantic period, and accordingly, piano music also entered a period of prosperity. Under this context, piano performance techniques were in continuous development and reform. Representative musicians included Czerny, Weber, Mendelssohn and Chopin (Ma, 2014). Czerny was a student of Beethoven’s, who was highly recognized and appreciated by Beethoven, and his performance style was also very similar to Beethoven’s. However, musicians led by Czerny focused more on
singing feature and percussion intensity of playing skills, so beautiful melodies of piano music could be more easily manifested. The sound changes were more delicate, the playing speed was more flexible and the piano pedal was used in a more unique way, so the beauty of piano was fully and vividly displayed.

4.4 Modern period

In the modern period, piano performance techniques were further upgraded. Players started to pay attention to pianissimo and the performance techniques experienced unprecedented innovations. Players were required to express their moods with pianissimos. Those pianissimos, like gentle touches of piano keys, created hazy and ethereal effects in the piano performance. In the beginning of the 20th century, the pianists, represented by Bartok, worked more on the presentation of timbres generated by keystrokes and put more effort in creating fresh, bold and harsh piano music. Based on folk music and by adding musical harmony, they created more primitive piano music.

4.5 Contemporary performance period

Since the 20th century, pianists have been continuously explored and gradually created more scientific performance techniques and piano performance has also gradually developed towards the use of fingers. Contemporary piano performance techniques focus more on the overall performance and continuous relaxation. Players need to relax their hands and upper bodies and play the piano naturally, but they also need to keep the muscles in some local parts like wrists, fingers and shoulders a little tightened. In the performance process, their fingers must exert strength, but the other parts must be kept relaxed.

5. REALIZATION PATH FOR AESTHETIC VALUE OF PIANO

5.1 Determining the rhythm type of the phrase – modeling using mathematical knowledge

5.1.1 Modeling

Phrase rhythm is the thing that needs most attention in the whole piano performance process. Players must determine the correct rhythm type according to the environment and the music content. This paper constructs 4 models – independence, position, time sequence and joint models according to the development of rhythm transformation and by reference to the existing results. The rhythm types are classified by music content. If the rhythm of a phrase is not related to the prelude, an independent phrase rhythm type should be constructed; if it is related to the prelude rhythm, then a time-sequential rhythm type should be constructed; if the rhythm and position of the phrase are both related to the rhythm of the prelude, a joint phrase rhythm type should be constructed. According to relevant materials, it can be found that the above four models can be expressed as the probability distributions of the phrase position and prelude phrase rhythm. Let it be p (position, T_{i-1}, T_i). Since different random variables have different relations, based on mathematical knowledge, different methods can be used to solve p, i.e.:

\[ p_{IM}(position, T_{i-1}, T_i) = p(position) \times p(T_{i-1}) \times p(T_i) \] (1)

\[ p_{PM}(position, T_{i-1}, T_i) = p(position, T_i) \times p(T_{i-1}) \] (2)

\[ p_{SM}(position, T_{i-1}, T_i) = p(position) \times p(TM_{i-1}, T_i) \] (3)

As the three factors in the joint model are the rhythm of the phrase, the rhythm of the prelude and the position of the phrase are interrelated, the joint distribution model cannot be spread out and can only be calculated by the mathematical calculation method. However, in some phrases, some special rhythmic phrase sequences never appear, which will lead to zero points in the joint model probability. Therefore, in order to avoid zero points, this paper uses the Bayesian probability estimation method to add a probability value. For example, if there are i samples whose value is 1 in the T samples. Then the above model can be used to do estimation, i.e.
5.1.2 Model evaluation

When constructing the rhythm of the phrase, one needs to fully understand the relationships between various modules; therefore, this paper will describe the evaluation method for the above models in detail, and elaborate on the relationships between various modules in the models. At this time, this paper will utilize the traditional mathematical model assessment method and entropy evaluation criteria and cross validation method to carry out the evaluation (Jia, 2014). When using cross validation, this paper will need to use the test set model to evaluate the hypothetical model and divide the data set into test set and training set, which will be denoted as \( p \) (position, \( T_{i-1} \), \( T_i \)) and \( q \) (position, \( T_{i-1} \), \( T_i \)), respectively. Then it can utilize mathematical knowledge to calculate the above models and finally obtain:

\[
\log L = \frac{1}{N} \sum N \cdot p(\text{position}, T_{i-1}, T_i) \cdot \log(p(\text{position}, T_{i-1}, T_i)) = \sum p(\text{position}, T_{i-1}, T_i) \cdot \log(p(\text{position}, T_{i-1}, T_i))
\]  

(5)

In Formula (5), the selected value for logarithm does not affect the conclusions drawn in the construction of the model, but in order to ensure the physical meanings of the three modules, the background will be set to 2 in the calculation. Thus, this paper uses the definition of entropy in the information theory to measure the performance of the model, but in the test set, i.e. the different music pieces, \( P \) is complex to different extents, which can be measured by information entropy, so it is set as \( H_p \), and the difference between the cross entropy and the information entropy and the test is set as the measure, and then you can obtain:

\[
H_p = -\sum p \log \frac{q}{p} = -\sum (p \log q - p \log p) = H_q - H_p
\]  

(6)

According to Formula (6), the evaluation errors between models can be obtained. Similarly, the error \( \Delta \) brought by cross entropy can also be tested using the above method, i.e.:

\[
\Delta = \frac{H_p}{H_q}
\]  

(7)

5.1.3 Result analysis

In order to make the results more direct, this paper selects three piano tracks, namely, \( \text{Islamey} \), \( \text{Chopin Mazuka Op.24/2} \) and \( \text{Chopin Mazuka Op.30/2} \). Each piece of music is tested several times to avoid the impacts of random errors. The specific evaluation results are shown in Table 2.

<table>
<thead>
<tr>
<th>Track List</th>
<th>model</th>
<th>Hc</th>
<th>Hr</th>
<th>( \Delta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islamey(1)</td>
<td>IM</td>
<td>7.17</td>
<td>0.97</td>
<td>0.16</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>IM</td>
<td>10.63</td>
<td>1.45</td>
<td>0.66</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>PM</td>
<td>5.80</td>
<td>6.90</td>
<td>0.60</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>PM</td>
<td>7.64</td>
<td>1.45</td>
<td>0.23</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>PM</td>
<td>13.31</td>
<td>6.90</td>
<td>1.08</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>PM</td>
<td>6.60</td>
<td>2.49</td>
<td>0.60</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>SM</td>
<td>7.06</td>
<td>0.86</td>
<td>0.14</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>SM</td>
<td>9.69</td>
<td>3.24</td>
<td>0.51</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>SM</td>
<td>5.60</td>
<td>1.49</td>
<td>0.36</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>JM</td>
<td>6.80</td>
<td>0.61</td>
<td>0.10</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>JM</td>
<td>7.74</td>
<td>1.36</td>
<td>0.20</td>
</tr>
<tr>
<td>Chopin Mar Jukka</td>
<td>JM</td>
<td>4.92</td>
<td>0.81</td>
<td>0.19</td>
</tr>
</tbody>
</table>
The calculation of the above models can provide reference for pianists in determining the rhythms of phrases and allow them to understand the relationships between the phrase rhythm and its position and the rhythm of the prelude so as to lay a good foundation for delivering wonderful music.

5.2 Enhancing musical hearing training – constructing a trinity perception model

Training musical hearing can get players highly sensitive to piano music so that they can have the right feelings and deliver the meanings of the piano music correctly to the audience. Musical hearing training includes 3 parts. First, players are trained on their perception of pitch interval. Pitch interval is the bond between pitches, which plays a unique role (Guo, 2014). Players can play the piano starting from a single interval and then form independent pitch combinations, such as practicing the fourth or fifth intervals and then gradually expanding the players’ perception of intervals. Subsequently, players can practice the sequence method. The music score is shown in Figure 1.

![Figure 1. Exercise score of the sequence method](image)

Second, players are trained on their perception of chord resonance. By playing the piano, a player can gradually change the tone, but he/she should make sure there is a connection between the first and following pitches. Finally, players are trained on their perception of the whole piano music works, so that the players can really get into the piano works and understand the relationships between different phonemes and the dialectical relationship between the musical note system and phonemes (Zhou, 2010). Musical hearing perception can also be trained using the multidimensional perception principle, specifically shown in Figure 2.

![Figure 2. Multidimensional perception model](image)

5.3 Consistency between artistry and technicality

5.3.1 Enhancing the training on piano performance techniques

Performance technique training is an essential step of aesthetic value realization. Only when a player has superb performance techniques can he/she express the inner feelings. Therefore, players not only need to master the traditional performance techniques, but also have to grasp modern ones. In a non legato practice, players have to grasp two performance methods - upper arm staccato and forearm staccato, creating even intervals between
sounds. At this point, the players’ movements need to be consistent. In legato practice, players should mostly practice playing lyrical melodies. This requires the players to tighten their wrists but relax their bodies so as to produce clear and gentle sounds.

5.3.2 Ensuring the inner presentation of the aesthetic values of piano performance

Table 3 List of sounds (local)

<table>
<thead>
<tr>
<th>E</th>
<th>F</th>
<th>G</th>
<th>C#</th>
<th>F#</th>
<th>D#</th>
<th>G#</th>
<th>D</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>Bb</th>
</tr>
</thead>
<tbody>
<tr>
<td>D#</td>
<td>E</td>
<td>F#</td>
<td>C</td>
<td>F</td>
<td>D</td>
<td>G</td>
<td>C#</td>
<td>A#</td>
<td>B</td>
<td>G#</td>
<td>A</td>
</tr>
<tr>
<td>C#</td>
<td>D</td>
<td>E</td>
<td>A#</td>
<td>D#</td>
<td>C</td>
<td>F</td>
<td>B</td>
<td>G#</td>
<td>A</td>
<td>F#</td>
<td>G</td>
</tr>
<tr>
<td>G</td>
<td>G#</td>
<td>A#</td>
<td>E</td>
<td>A</td>
<td>F#</td>
<td>B</td>
<td>F</td>
<td>D</td>
<td>D#</td>
<td>C</td>
<td>C#</td>
</tr>
<tr>
<td>D</td>
<td>D#</td>
<td>F</td>
<td>B</td>
<td>E</td>
<td>C#</td>
<td>F#</td>
<td>C</td>
<td>A</td>
<td>A#</td>
<td>G</td>
<td>G#</td>
</tr>
</tbody>
</table>

The emotions of the player and the audience are one of the artistic expressions of the piano performance. The player can stimulate the hearing of the audience and change their mood by changing the timbre and sound intensity in the piano performance, so that the emotions can communicate in people’s consciousness, and ultimately make the audience appreciate the beauty of piano music. Second, the aesthetic value needs to be reflected in the cultural level. Piano has a long history, and it changes with the development of human culture, which also involves the unique cultures of different ethnic groups and the ideologies of different social periods. Everyone has a unique aesthetic perception. It can be said that piano is the embodiment of human civilization development and the presentation of human wisdom. Therefore, the works of different periods reflect the social awareness in those different periods. For example, Beethoven’s piano music mostly reflects his personal struggle (Li, 2010) while Liszt’s piano music mostly shows the national customs and patriotic feelings and so on. This paper employs the sound list to understand the use of phonemes, in an effort to help us understand the development of cultures, as shown in Table 3.

6. CONCLUSION

Musical hearing is an integral part of piano performance. This paper, based on musical hearing, analyzes the evolution of piano performance techniques, helping people understand the development history of piano art. Only by knowing piano very well can one play the truly emotional music that touches people’s hart and show the beauty of art in piano performance.

REFERENCES