Enlightenment on Vocal Music Classroom Teaching from the Perspective of Neuroscience

Yongfang Zhang

ABSTRACT
With the deepening of researches on brain science, more and more educators begin to pay attention to the sensitive period and plasticity of brain development, as well as the application and transformation of related research results in vocal music classroom. This study briefly introduces the relationship between neuroscience and vocal music classroom teaching, the factors influencing vocal music classroom teaching from the perspective of neuroscience, and the new approach of studying vocal music classroom teaching from the perspective of brain science. At the same time, this study also describes the characteristics of imaginary thinking based on neuroscience in singing art activities, such as showing images, blending scenes, and teacher's vocal skill training in vocal music teaching. It also provides theoretical basis for the further study of vocal music classroom teaching based on neuroscience by applying the emotional characteristics of singing thinking in singing art activities, such as "emotion," and how to induce students' emotion of singing thinking by teachers in vocal skill teaching.

Key Words: Brain Neuroscience, Vocal Music Classroom Teaching, Enlightenment, Musical Cognition

Introduction
Vocal music classroom teaching is a kind of unique teaching form aiming at exploring human's own potential. It takes the sound as the expression means, touches human emotion, acts on the human soul, and gives human with the multi-sided influence and edification. With the deepening understanding of brain science, we realize that neuroscience will provide a new perspective for vocal music classroom teaching, and have potential value and prospect in researches on vocal music classroom teaching. How to apply the research results of brain science to universal music education and thus produce an important influence on the decision-making and practice of music education will be an applied research direction with exploration potential under the background of cross-disciplinary integration (Li, 2015). Figure 1 is an auditory interaction phenomenon in musical performance, indicating the feedback interaction that occurs during the music performance. When a musician plays a musical instrument, his brain motor system controls his hands to generate music through fine motion to play the musical instrument, the music is transmitted to the auditory cortex through the brain auditory pathway, and the motion system is adjusted through the auditory motion interactive system, in order to make the produced music meets the desired requirements (Richards, 2012).

By analyzing the literatures related to the research of music and neuroscience at home and abroad in recent years, we find that the brain evoked potential responses of subjects are related to individual factors and various musical elements. These factors mainly involve age, gender, cerebral hemisphere asymmetry, music rhythm and melody. Music mode and velocity mode is related to pitch, mode changes with the

Corresponding author: Yongfang Zhang
Address: School of Music and Dance, Bengbu University, Bengbu, Anhui 233000, China
e-mail bbxyzyf0925@126.com
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change of pitch and mode experience depends on the distance between pitches. Mood of music (Liang, 2015), and the influence of music and language on brain mechanism.

**New Approaches to the Study of Vocal Music Classroom Teaching from the Perspective of Brain Science**

People's thoughts, emotions and behaviors come from the brain, and the workings of the brain affect every detail of people's daily lives. In this sense, to study the function of vocal music classroom teaching, it's necessary to start with the relationship between vocal music teaching and brain. It's crucial to carrying out researches on vocal music and brain, promote the development of brain, and then provide scientific perspective for promoting national quality by vocal music, and give more scientific and rigorous empirical research support for the development and popularization of vocal music art and education.

**Vocal music classroom teaching and the cultivation of creativity**

The empirical research on the role of vocal music classroom teaching in cultivating students' creativity provides scientific arguments for the important functions of vocal music classroom teaching in the all-round development of human beings, and thus provides a musical angle of view for the development of vocal music education in educational decision-making, contributing to the further optimization of vocal music classroom teaching decision-making.

**Vocal music classroom teaching and the cultivation of aesthetic education**

Specifically, on the neural mechanism of vocal music aesthetic education function, we also need to study the influence of vocal music teaching on the limbic system, especially on the amygdala, and how to regulate the limbic system in the cerebral cortex (Hanggi et al., 2010).

**Vocal music classroom teaching and the promotion of physical and mental health**

From the point of view of promoting mental health, the basal nucleus and brain stem located in the brain release neurotransmitters under specific conditions, which affect, drive and regulate human emotions and behaviors (Usha, 2006).

**Research on vocal music classroom teaching from the perspective of neuroscience**

For introducing neuroscience into vocal music classroom teaching, first of all, we should have a correct understanding of the connection between neuroscience and vocal music classroom education, and what neuroscience can provide for vocal music classroom education to promote a new development of vocal music classroom education. This forces us to have a certain understanding of neuroscience, and also understand the value, purpose and importance of contemporary vocal music classroom education (Vlastelica, 2011). Contemporary vocal music classroom education is a multi-disciplinary subject. There are essential areas of importance in both education and music. Firstly, as far as the vocal music classroom education is concerned, it has the intrinsic value attribute of music, that’s, it reflects the essential attribute, functional purpose and other fundamental propositions of music education through pedagogical music.
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(Zhang, 2018). Secondly, from the special value attribute of vocal music classroom education, music education also has the educational attributes of aesthetic and art education, that’s, it plays a unique role in the development of human comprehensive ability through music education. Thirdly, with the application of the research results of brain science to vocal music classroom education, the research results of neuroscience can better serve music education (Chen, 2009). Therefore, the greatest significance of combining neuroscience with music education is to explore a teaching method that conforms to the physiological structure of human brain and is the most suitable for human to use brain to learn music.

The characterization of imaginativeness in brain neuroscience in vocal art activities

From the physiological mechanism, one of the functions of neuroscience is imagination. It is the process in which the old temporary connections in the human brain are recombined to form new temporary connections (Sun, 2010). In life, when people perceive objective things, a lot of traces will be left in their cerebral cortex, and temporary neural connections among traces will be established, forming a temporary neural connection system. The more experience people have, the richer this temporary neural connection is. From the point of view of vocal performance, the imagination of singing thought refers to the ability of the subjects of singing thinking to form a concrete artistic conception in the mind when singing vocal music works.

The artistic conception contains a new image processed on the basis of the original representation (Du, 2008). For example, in terms of Beautiful Grassland My Home (see Figure 2 for music score), the beautiful and broad melody and poetic lyrics together bring people to the boundless Mongolian grassland, as if there are flying butterflies and galloping horses before eyes, ... The images of these objects are the new images created by human brain through imagination on the basis of representation.

Figure 2. A sample of the song "Beautiful Grassland My Home"

The Application of Brain Neuroscience Emotion in Vocal Music Teaching

In the course of vocal music teaching, it is very important to develop the imagination of students’ singing thinking through the cognition of neuroscience. In vocal music teaching, students’ singing thinking is full of abundant imagination all the time. Physiologically, the emotional experience is determined by the neural excitations of the subcortical central nervous system and the physiological processes produced in the autonomic nervous system. Its specific nerve mechanism is that under the influence of stimulants, the cerebral cortex produces excitement, spreads along the cortex to the subcutaneous center, and causes the activity of the subcutaneous center, which sends out the nerve impulse, thus causing changes in the activity of internal organs, glands, etc., as well as corresponding activity of bone and muscle through the somatic nerves. Thus, the various internal and external manifestations occur while human beings have emotions (Tang, 2017).

For example, the melody of the fourth lyric of Meng Jiangnu (Figure 3) draws lessons from the expression technique of Chinese opera board cavity music, uses the cradle music that beats quickly and plays slowly, reproduces the rhythm on a new bB tone and broadens Meng Jiangnu’s theme music. The rapid sixteenth note as the accompaniment, which is sharply contrasted with the loud and sonorous singing, vividly presents the firm and inflexible image of Meng Jiangnu who is yearning for husband and wife reunion against a flying snow and the piercing cold wind.

In particular, at the end of the drama, the stack music that advances first slowly and then quickly pushes the entire song to the climax in a tight rhythm, continuously advancing from the second half of the beat, and the bB tone at the end of the song represents in the form of tragic, angry
and crying music. Through the tragic fate of Meng Jiangnu, it expresses the resistance to the autocratic rule of the old society and the most incisive complaint. When the student sings this paragraph, their singing thinking is affected by the lyrics and the melody together, and you can deeply experience the chill of north wind and cold snow and Meng Jiangnu's strong inner emotion change. With the fluctuation of melody layer upon layer, all can feel the heroine's plaintive, sad, resentful but helpless mood in the singing process. This kind of intense inner emotion will become the inner power of the singer's singing thinking, so that the singer can have full breath control, and bring the sad and regretful feelings into the singing, so that the singer sings wonderfully with a silver voice and deep feeling.

Figure 3. The Legend of Song "Meng Jiang Nu"

The Application of Neuroscience Emotion in Vocal Technique Techniques

In vocal music teaching, vocalization practice is the most important link in the stage of practicing vocalization. Therefore, in teaching practice, teachers can inspire students to change monotonous practice into meaningful and emotional singing (Sousa, 2011). Although there is no complete musical thought and no lyrics in vocalization, teachers can inspire the students emotionally: such as singing “beautiful grassland”, “vast sea”, and “dear motherland” with emotion. When students see the teacher’s eyes full of emotion, their singing thinking must be touched, triggering the emotion required for the vocalization. Thus, when practicing vocalization, the students can do it in the corresponding situation. In this way, learners not only practices vocalization, but also experience different emotions, which is the practice of killing two birds with one stone.

For example, humming practice, as shown in Figure 4.

For this simple three-degree exercise, you can inspire your students to praise a beautiful scene, an event, or a character.

Figure 4. The notation of “Heng Ming Practice”

For example, to praise the spring with flowers in full bloom, first of all, let students send out a voice from the heart: "Too beautiful!" As long as their feelings are genuine, humming sounds will naturally smooth. Because in our life, anyone experiences the emotion of "praise". With sincere praise, you must be excited, which will easily open the cavity, and it is easy for the sincere emotion to make the breath sink, and the humming under deep breath support will be very full, and have passion. For the students whose throat is tight and breath is stiff and shallow, you can let them add a "sigh" character at the same time of praise. If this praise is voiced correctly, the breath is loosened, and the tight throat also can relax at the same time.

Another example is that in the vowel vocal exercises, if the teacher does not mobilize the inner emotions of the students, but simply teach resonance, position, breath and others, which easily makes students’ singing thinking into a dead end and focus their attention on looking for position by eyes lifted, breath by hands on waist, feel the status by five organs and find the feeling of pointing to the sky and the land. Once this habit is formed, it is very difficult to correct it. Therefore, we should try our best to arouse the students’ inner emotions in all vocal training. For example in vowel training, please see Figure 5.

Figure 5. Vowel Practice Exercises

In this vocalization exercise, the teacher tries to prompt the students with emotional words at the intervals of half-tone upper- and down-chord
The upper-chord should be with feelings of pleasure, excitement, and call while the down-chord should be with the broad, profound, sad and desperate feelings. Students with empty voice should sing with firm, brave, bold and generous and confident feelings while students with stiff and heavy voice should sing with lyric, soft, weeping, and disappointing feelings.

This kind of emotional vocabulary prompt can stimulate the student's initiative of singing thought, then they can positively cooperate with the teacher's prompt, and make the accurate emotion reflection with the sound. With the change of emotional vocabulary, the volume, timbre, intensity and speed, together with air and gesture and the momentum of singing will change. The students focus on emotional expression and avoid the appearance of many strange problems. Emotion drives the sound, so that this vocalization exercise has both emotion and sound.

The Application of Cognitive Neuroscience in the Cultivation of Students' Vocal Musical Psychological Quality

In vocal music teaching, there are often such students: they attend the class like standing trial, being confused with much concerns, and always worried that they cannot sing well. Once in a test, as sentenced, they are too nervous to self-govern and eventually cannot do well in the exam.

In training such students, we should pay more attention to singing thinking activities with emotion, and encourage students to sing boldly with emotion. As long as singing with emotion, they shall not be afraid once the voice is not in place at the moment. Because as long as they have true feeling, singing state will be active, and it’s easy to use the breath, and thus is easy to sing in the right way, with the much better effect compared to the sound alone. On the other hand, students can read the lyrics aloud and affectionately. For example, exercises with words (Figure 6):

1 3 5 3 | 1 — ||
I want to sing

Figure 6. Word practice music score

Students are encouraged to recite the desire to sing with full confidence, then to read it twice as long, and then to do the vocalization exercise on the basis of the recitation, which can quickly reach with both emotion and sound, including accurate pronunciation and tone of voice.

Conclusions

The role of neuroscience in human brain information processing has been widely studied. Many scientists who study musical cognition find that when the subjects are listening to music, by means of multi-disciplinary and multi-level prospective vision, and combining the research results of brain science with the practice of music quality education, we can point out the direction of teaching planning for music educators to a certain extent. In the process of vocal music teaching, teacher should pay attention to cultivating students with rich cognition of neuroscience. At the same time, students should pay attention to exercise and develop self-vocal music thinking ability in the process of studying vocal music, and should enrich their imagination, emotion, creativity and aestheticness of objective things with cultural knowledge, so that each feature of vocal music thinking can be fully reflected in singing.

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