PROMOTING EFFECT OF MENTAL REGULATION INDUCED BY POSITIVE EMOTION ON VOCAL MUSIC EDUCATION

Yue He

Abstract

Vocal music is any of the genres for solo voice and voices in combination, with or without instrumental accompaniment. The evaluation of teaching performance is helpful to improving the vocal music education. This paper mainly explores the effect of mental regulation, which is induced by positive emotion, on vocal music education. First, a curriculum model of positive emotion induction was established after quantifying and qualifying the emotion induction process. The model integrates human emotion with the breathing state during learning. Then, the model was applied to experiments on students from three colleges and universities, some of whom major in vocal music. The subjects were tested under four conditions, and evaluated by 12 indices on RStudio-1.0.44, SPSS 22.0 and E-Prime2.0. The results show that vocal music education is positively related to mental regulation; the positive emotion of the subjects receiving positive emotion induction was significantly improved through the experiments under all four conditions, indicating the effectiveness of our model; positive emotion is beneficial to the learning of vocal music. The research findings provide theoretical support for applying emotional induction in music education and mental health education.

Key words: Emotion Induction, Mental Regulation, Positive Emotion, Negative Emotion, Vocal Music.

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INTRODUCTION

Vocal music education starts from the basic education and extends to the comprehensive education, which may realize the education from the outside to the connotation and influence individual’s physical and mental health in an all-round way, with the dual effect of “beauty” and “feeling” in mental regulation (Tai & Chau, 2009). Therefore, the educational effect of vocal music education has become an important subject for teaching researchers. However, how to effectively exert the effect of vocal music teaching to the utmost, truly realize the teaching effect, and regulate the change of human emotion through the beauty of vocal music to achieve the teaching effect of mental regulation is the core of many vocal music educators and even mental health educators (Groarke, Curtis, & Kerin, 2013). Previous studies have shown that emotion is a key factor in many teaching result (Pilar Sanjuán, Ruiz, & Pérez, 2011). Students are easily influenced by emotion in the process of learning (Ester, D. 1997), and the effect of learning shows a tendency of fluctuation, and positive emotion has a positive correlation effect on the learning effect. However, it is a difficult point for scholars to develop positive emotion, and a lot of experiments have been conducted to improve the research stage (Fan, 2014). Whether emotional teaching can be applied in vocal music education is still rare. At present, there are few literatures about this (Brooker, Curran, James et al. 2005). It is believed that the traditional context of vocal music education is conducted around music form, history, content and analysis, and “emotion” does not have the status. Relevant literatures (Ying, 2013; Gilbert,
Adding qualitative data before experimental study

In the process of experimental research additive data

Interpretation of experimental results

To investigate the experimental experience of the subjects, Adjust the intervention plan in time

Experimental study (with implementation scheme of pre-test and post test)

Adding qualitative data after experimental study

Recruit the subjects, Design interventions

THEORETICAL BASIS OF MENTAL REGULATION INDUCED BY EMOTION

Psychological and physiological basis of the function of positive emotion induction

As for the theory of emotion induction, some scholars believe that people’s psychological and physical activities can produce emotions, but they all produce basic emotions such as happiness, sadness and anger. These emotions can be transmitted. As the basic starting point of emotion induction in this study, the produced emotions can be transmitted to the brain center through the stimulation of human psychology and physiology in some way, so as to achieve regulation by neural response (Ostir, Berges, Ottenbacher et al. 2008). Assuming that E is induction emotion, M and L represent the purposes that the regulation objects want to achieve, we can use an equation to express the relationship between them, M*E=L, where the induced E on the relationship between music and emotion, the variable of mental regulation function and the variable of emotion are not fixed, but a gradual continuum. The factors at both ends of the curve are from simple to complex, and the change of any factor will lead to whether the induced emotion is positive or not. The degree of high and low induction theory emphasizes the influence of stimulation on individual psychological and physiological responses. Based on the understanding and literature summary of the above theories, this study proposes a model of positive emotion induction management and control and the guidance conditions refer to Figure 1. As the frontier and trend of cognitive neuroscience in the field of induced emotion, the model of intersection psychology demonstrates that the induced emotion mainly stimulates nucleus accumbens septi, ventral tegmental area and hypothalamus. The research orientation of cognitive neuroscience approach to music emotion improves the shortcomings of behavioral paradigm in the study of situation lack of life and authenticity to a great extent, which indicates a great space for research in this field.

Figure 1. Control model and guidance conditions of positive emotion induction
Construction of vocal music education model under the condition of mental regulation function

The commonly used theoretical models in psychological study are causal model and interpretive model, which emphasize that people judge the emotion induced by vocal music and express it as a process of evaluation. Based on the inverse inference of this theory, this study adopts the mixed method, that is, the quantitative research and qualitative research of emotion induction are organically integrated. A curriculum model of positive emotion induction is established in the quantitative research. The whole model is designed based on the psychological and physiological basis of music-induced emotion (Dancy & Handal, 1984). The theory of induction stresses the main contents emphasized in the teaching process to stimulate the influence on individual psychological and physiological responses, thus providing psychological argumentation and feasible vocal music argumentation for the study of this theory, so as to determine the function and effect of vocal music teaching. As shown in Figure 2, the function of vocal music teaching is divided into three categories: main body effect, synergetic effect and cultural effect. The relationship among music, nature and culture is correspondingly investigated, so that the emotion induced by vocal music can be returned aesthetically. According to this function, the condition factors of positive emotion induction are determined.

In summary, emotion can be divided into absolute model, dimensional model and special model. According to the classification type of emotion, relevant features can be integrated. By referring Figure 3, we can obtain 12 evaluation points of relevant emotion loop model, including positive emotion, low arousal, high arousal and negative emotion.

Figure 2. Function and effect of vocal music teaching

Figure 3. Dimensions of different emotion models
VERIFICATION AND ANALYSIS OF EMOTION-INDUCED MENTAL REGULATION FUNCTION IN VOCAL MUSIC TEACHING

Analysis on teaching practice of vocal music after mental regulation induced by different emotion

This study aims at exploring the mental regulation by inducing different emotions to verify the type characteristics of vocal music and learning effect of listening. Before the experiment, two hypotheses are set. Hypothesis 1: There are differences between sound scene music stimulation and non-sound scene music stimulation in the effects of skin electricity, skin temperature, heart rate and muscle electricity. Hypothesis 2: In the way of music listening, abdominal breathing and thoracic breathing are different in the effects of skin electricity, skin temperature, heart rate and muscle electricity. This experiment belongs to a multi-factor completely randomized experimental design in which each subject is treated with 4 experimental conditions. In order to avoid effect, 4 × 4 standard Latin square design is adopted. The subjects are 215 students (112 male and 103 female students) of vocal music and non-vocal music majors of three different colleges and universities, aged 18-25 years, with an average age of 21.5 years (SD=1.25 years). All subjects are free of cardiovascular and respiratory diseases, and no strenuous exercise is performed 2 hours before the experiment. In the experiment, the degree of influence factor, the degree of commonality (expected value) and the effect value are used to judge the effect of the hypothesis experiment. The data are analyzed by RStudio-1.0.44 and SPSS 22.0 (Chicago, IL, USA) procedures, and the final results are shown in Table 1.

Table 1 shows results of measuring positive emotion and negative emotion. PA represents positive emotions (Figure 4 is a visual data chart), and NA represents negative emotions (Figure 5 is a visual data chart). As shown in Table 1, the influence factor of positive emotion in vocal music learning is higher than that of negative emotion, and positive emotion is more sensitive to the stimulation of vocal music, and its value is above 0.5, which indicates that positive emotion is more concentrated on the learning effect of vocal music and is easier to achieve a set effect value. The value of negative emotion is below 0.5, which doesn’t reach the mean value. The effect of negative emotion on vocal music learning fails to reach the expected value. CR value represents the relative value of the improvement effect of mental regulation by using the induce emotion. As can be seen from the data in the table, the promotion effect of

| Emotional types      | Factor loading | Common degree | CR value |
|----------------------|----------------|---------------|----------|
|                      | PA             | NA            |          |
| Active               | 0.87           | 0.723         | 10.653   |
| Full of enthusiasm   | 0.858          | 0.695         | 12.891   |
| Happy                | 0.808          | 0.752         | 11.565   |
| Exuberant            | 0.799          | 0.599         | 12.693   |
| excited              | 0.773          | 0.523         | 16.321   |
| proud                | 0.698          | 0.598         | 12.369   |
| rejoicing            | 0.736          | 0.559         | 15.396   |
| experienced          | 0.599          | 0.652         | 12.963   |
| abundantly           | 0.695          | 0.758         | 14.863   |
| Appreciative         | 0.725          | 0.652         | 16.339   |
| Ashamed              | 0.696          | 0.425         | 8.765    |
| sad                  | 0.725          | 0.469         | 7.395    |
| afraid               | 0.693          | 0.586         | 6.238    |
| nervous              | 0.588          | 0.469         | 9.125    |
| frightened           | 0.596          | 0.330         | 5.183    |
| guilty               | 0.621          | 0.365         | 6.235    |
| irritable            | 0.633          | 0.425         | 7.559    |
| Trembling            | 0.658          | 0.319         | 7.421    |
| exasperated          | 0.460          | 0.335         | 5.963    |
positive emotion induction on the mental improvement is also significant in addition to the improvement in the learning effect. Therefore, the results of emotion induction test based on sensory hypothesis show that the effect of emotion induction on vocal music learning is positive under different background conditions.

Figure 4. Results of positive emotion evaluation

![Figure 4](image1)

Figure 5. Negative emotion evaluation results

![Figure 5](image2)

In order to know whether the type of vocal music and breathing pattern have a significant effect on emotion induction, the test subjects are measured one by one by means of multiple variance analysis of emotion on the basis of experiment 1. Its purpose is to find out the direct influence of different emotion induction on the learning performance of vocal music in different time periods, and the experimental procedure is compiled with E-Prime2.0 software. The procedure consists of three parts: baseline data collection, positive emotion induction and scale filling. Each stage time is 120 seconds. After each positive emotion induction, the scale is filled out. The experimental condition for each subject is a random representation of the Latin square. If the corresponding results are successfully induced, this experimental data are also statistically analyzed by using RStudio-1.0.44 and SPSS 22.0 (Chicago, IL, USA) procedures. Unless otherwise specified, the mean value of all the measured data shows a significant difference at P < 0.05. The measurement results are shown in Table 2.

Table 2. Variance analysis results of vocal music learning induced by different emotions

| Emotional types     | mean square | F value | Sig  |
|---------------------|-------------|---------|------|
| Active              | 44.68       | 36.89   | 0.12 |
| Full of enthusiasm  | 39.60       | 37.63   | 0.23 |
| Happy               | 51.60       | 42.96   | 0.36 |
| Exuberant           | 42.13       | 39.16   | 0.25 |
| excited             | 35.36       | 29.56   | 0.61 |
| proud               | 29.86       | 28.13   | 0.18 |
| rejoicing           | 42.35       | 28.55   | 0.26 |
| experienced         | 31.45       | 26.31   | 0.45 |
| abundantly          | 29.83       | 25.36   | 0.36 |
| Appreciative        | 35.62       | 29.63   | 0.28 |
| Ashamed             | 5.36        | 9.36    | 0.95 |
| sad                 | 5.13        | 10.65   | 0.49 |
| afraid              | 10.68       | 11.63   | 0.69 |
| nervous             | 1.96        | 6.36    | 0.78 |
| frightened           | 2.56        | 7.65    | 0.85 |
| guilty              | 3.78        | 5.96    | 0.89 |
| irritable           | 9.65        | 11.63   | 0.63 |
| Trembling           | 2.56        | 15.23   | 0.85 |
| exasperated         | 2.98        | 9.65    | 0.93 |

Figure 6. Analysis of variance of vocal music learning induced by positive emotions

![Figure 6](image3)
human emotions, and the result shows that it can explain 98% of emotions. If the dimension of “stress” is added, the explanation rate increases by 1%, and the addition of stress can better explain the emotion induced by music. When music emotion is explained by three dimensions of valence, arousal and stress, the explanation rate will reach 99%, and the performance of induced positive emotion is increased by 28.5% and 44.3% compared with that of normal emotion and negative emotion, respectively.

**Practical analysis on the function of mental regulation in realizing the performance of vocal music education**

In the process of vocal music learning, the factors that influence the learning effect are complex and changeable. In terms of the main body of influence, the speed and mode are the key factors affecting the emotion in the interaction between the learners, the listeners and the external environment due to the different emotional characteristics of the learners. “Music score” is the main presentation mode of sound works. In the sound works, the acoustic analysis of sound scene music becomes very important due to the addition of non-melodic original sounds, mainly including time-domain waveform analysis, spectral analysis of music segments, analysis of sound spectrum and sound volume, and extraction analysis of sound scene elements. The results are shown in Figure 8 by tracking the learning of subjects under different emotion situations with vocal music atlas record tracking instrument.

**Figure 8. Measurement results of different emotional vocal music atlas recording tracker**
Table 3. The difference of positive and negative emotions before and after test under different conditions

| Test scheme | Positive emotions | Negative emotions |
|-------------|-------------------|-------------------|
|             | Pretest (M±SD)    | Post test (M±SD)  | Sig | Pretest (M±SD)    | Post test (M±SD)  | Sig |
| I           | 15.69±4.52        | 23.91±6.14        | 5.62 | 14.77±3.49        | 12.95±2.94        | 3.54 |
| II          | 16.17±5.29        | 21.64±7.45        | 4.99 | 14.53±4.58        | 13.37±3.96        | 3.86 |
| III         | 16.89±4.32        | 21.01±6.14        | 5.62 | 15.87±3.49        | 12.85±2.94        | 3.54 |
| IV          | 14.98±5.19        | 15.02±7.45        | 4.99 | 15.33±4.58        | 15.67±3.96        | 3.86 |

Figure 8 shows a cognitive map of vocal music learning under two different stimulating emotions. The waveform of vocal music learning in Figure 8a shows more obvious steady-state characteristics, uniform trend of sound type, and obvious periodicity. There are no peaks and strong graininess, which indicates that the emotion of learning is stable. The waveform of vocal music learning in Figure 8b shows a strong contrast. Because of the melody composition of the vocal music, the waveform has obvious graininess, and has visible peaks, especially in the later stage. It indicates that the emotion during learning presents a fluctuating state, and the corresponding learning effect is also relatively poor. It can be seen that the noise characteristics of vocal music learning under different emotional states make the acoustic effect of the waveform and the overall acoustic atmosphere different from each other due to different emotions for the addition of the original growth information of emotion, and the learning effect is also different. Positive emotion is conducive to a stable and quiet learning state of vocal music.

Based on the above analysis, in order to further verify the difference between the positive emotion induction and the negative emotion induction, emotional response refers to different breathing patterns under different emotions (Jodoin, Bergeron, Khalifé et al., 2011). The effects of learning in vocal music are different. The learning model described in this study is used to test positive emotion and negative emotion, and the measured differences are tested as shown in Table 3. It is assumed that there are four conditions in this study. Condition I represents sound scene vocal music × abdominal breathing, condition II represents non-sound scene vocal music × abdominal breathing, condition III represents sound scene vocal music × thoracic breathing, and condition IV represents non-sound scene vocal music × thoracic breathing.

It can be seen from Table 3 that in the four experimental conditions of I, II, III, and IV, the scores of positive emotion are increased in different degrees, while those of negative emotion are decreased in different degrees before and after test. The difference between the two is significant. The results of the difference test in Table 3 show that the manipulation of the four experimental conditions is effective. It is concluded that positive emotion is beneficial to the improvement of the learning effect of vocal music, and the positive emotion induction model established in this study has implementable use effect.

CONCLUSIONS

Based on the function model of vocal music teaching proposed in this study, 12 evaluation points of four kinds of emotion induction characteristics are summarized and analyzed, which are implanted into the object evaluation system, and the mixed test method is adopted. Finally, it is concluded that the learning effect of the teaching performance of vocal music is obviously improved under the condition of positive emotion, and the methods of inducing positive emotion are discussed. The concrete conclusions are as follows:

(1) Vocal music education is positively related to mental regulation, and the theoretical basis of acoustic function in philosophy and aesthetics, psychology and physiology and cognitive neuroscience provides theoretical basis for the realization mechanism of mental regulation function in vocal music education.

(2) The results of self-evaluation scale show that in the process of positive emotion induction, the values of positive emotion are significantly improved in different degrees under the four experimental conditions before and
after test, and the performance of positive emotion induction is higher than that of normal emotion and negative emotion by 28.5% and 44.3% respectively.

(3) Positive emotion is beneficial to the improvement of learning effect of vocal music, and the positive emotion induction model established in this study has implementable use effect.

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