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# Research of lens model in music emotional communication

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ABSTRACT

Emotional exchange is an important part of the research in the field of music, starting from the essence of music, it requires the resonance between the performer and the listener to show the value of music performance, which can form a process of emotional communication between the performer and the listener. However, in the past, the study process mainly explain the emotional communication in music through written text, and its application and theory value is not fully captured. This study specifically discusses the establishment of lens model in the research and exploration, expands the thoughts from Brunswick's lens model, and effectively guarantees the application value of the research. From this research we can see the traditional lens model has certain disadvantages, for its judgment of the emotional communication factors between the performer and the listener is scientific or accurate enough, and this study improves the old model and makes enhancement in this aspect. This study specifically discuss the lens model equation, and combines the regression model between the performer and the listener with the lens model equation to build the corresponding mathematical model, and to make the research process of lens model more comprehensive and specific. Finally it is the introduction of the existing musical emotion classification models to make effective supplement to this study, providing this research process with strong theoretical and practical value.

KEYWORDS

Musical emotion; Lens model; Emotional communication; Model research.
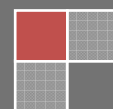
INTRODUCTION

From the emotional level, music performance is mainly about the an effective emotional exchanges between the performer and the listener, and thus the rich emotions in the music could be better expressed. The emotional communication process needs the support from many factors to be achieved, and the effective application of the lens model is the key factor. This study conducts research combining with the establishment of Brunswick's lens model, the lens model equation, the existing musical emotion classification models. The ideas of this research are more clear, the direction of this research is more clarified, and the science and rationality of this research can be guaranteed.

LENS MODEL

The brunswick lens model

In 1939 Brunswick effectively built the organism-environment model, and accordingly explained his ideas, then the intuitive functionalism model was formed. In 1952 Brunswick effectively improved the model, and defined it as the lens model. During the construction of the model, Brunswick mainly did effective research the uncertainty factors in the inner world of the perceiver, making perception defined as the indirect process of the proximal clues getting the distal variables. However there are some uncertain factors in the clues from the environment, and it form a probability[1] between the proximal clues and the distal variables. In the process of this study, the adaptability between the intuition and the environment keeps growing, so the perceiver needs to effectively determine the relationship between the clues, and effectively convert useless clues into useful clues.

Brunswick's lens model (as shown in Figure 1) makes the psychological analysis that is to be conducted as a system, which mainly consists of two subsystems -- the environment and the organism. These two subsystems intersect with the proximal clues. In the subsystem of environment, however, clues remaining dispersed and with interchangeable functions at a certain level have to be restructured, so as to ensure that there is effective access to the objective law. In this regard, this model mainly effectively discusses how the perceiver can restructure the environmental information and convert it into intuition.
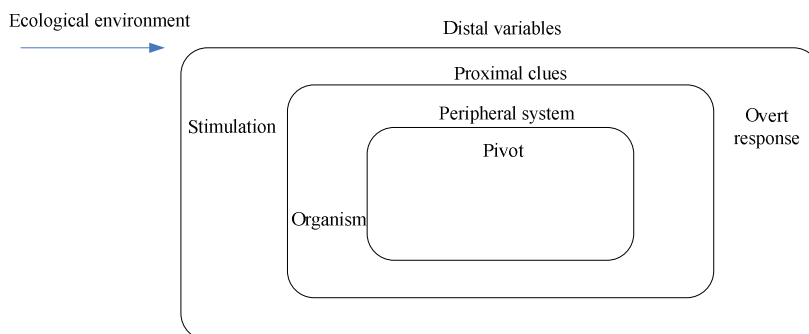

Figure 1 : Brunswick's organism-environment lens model

Brunswick's lens model had a positive impact on academic research of music in a great scope. In this regard, in 1985 the Brunswick Association was established. Until now, researchers in many countries have adopted this model for the effective research of psychology and expanded their areas of research.

Modified lens model

Justin pointed out that after improving Brunswick's lens model it can give effective description the communication process in the music research process, as shown in Figure 2. The process of improving the model, however, focuses on the study that how performers can effectively encode the left emotional clues, and specifically explores how listeners can encode these emotional clues, thus to have effective expression in the determination of emotion. However in these clues there is no need to make a specific expression of emotions, and from this point of view, there is probability in these clues[2]. This requires the listener to flexibly integrate the clues, thus to effective judge the expressing process.

In the lens model, the relationship between the player's intentions and a clue during the performance can fully reflect the ecological validity of the clue. However this validity is an evaluation index that foresees its own existing validity for the performing intention of a certain clue. Whereas higher its validity fully shows that the performer expresses his/her performing intention of this clue with high accuracy. To unified clues, however, the functional validity indicates the relationship between the clue and the listener's own judgment. And functional validity is an important indicator to effectively evaluate the predicted value of the listener's judgment. When the functional validity of the clue is high, the listener is able to effectively determine the performer's own intention with the clue, and the listener's judgment has high accuracy. The achievement means the accuracy of the effective communication between the listener and the performer, and achievement is measured mainly by the performer's own expression of intention, as well as the listener's own judgment. The so-called

matching is how much the ecological validity can overlap with the functional validity, and it is the mutual code between the performer and the listener.

As can be seen from the improved lens model, there are some differences between it and the original model. The first difference is that Brunswick's original model mainly discusses the relationship between the collective and the environment, and the improved model effectively indicate the relationship between the performer and the listener. The second difference is that the original model expresses the clues on both sides of the lens with the ecological validity and the usage of clues, and the improved model mainly converts the relationship of the ecological validity and the functional validity, and effectively express the relationship of both sides of the lens model[3]. The Lens model of emotional communication in music performance is shown as Figure 2.
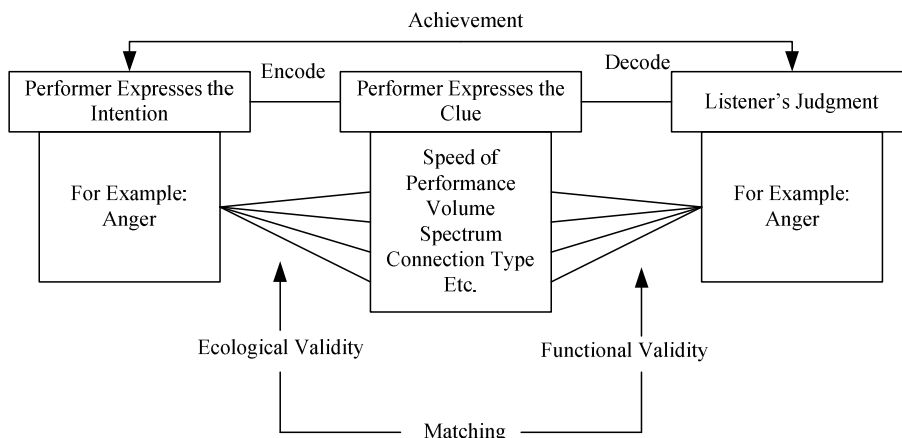

Figure 2 : Lens model of emotional communication in music performance

However the modification of the model has broader implications. First of all for the performancer's own expression, the relationship with the listener may only be a probable correlation, and his/her achievements may only have a corresponding probability. Then in the study of the reasons for the success or failure of emotional communication in a particular environment, the improved model can express the relationship between the performer and the listener with the same concept. Then, because there are interlinkages between the performer and the listener, and the processes of using the clues have high similarity in varying degrees of success, it is adequately demonstrated in this respect that there is no strict requirement for the process of using the clues. In that respect, it can be shown that the performer's own playing style does not need to be simplified or communicate with the listener's feelings. With the concept of alternative features for music listeners, Brunswick effectively described the effective method for the listener to convert the clues during its clues, combining useless music clues with another kind of music to express useful music clues. However this alternative functions represents the substitution effect that one certain clue makes on music emotional communication by the corresponding emotional expression or the process of recognition. Thus the clue becomes an important clue in the music emotional communication, and can be effectively used in the emotional communication process. For the research and exploration of musical emotion communication, the relationship between the performer and the listener is hidden in the interior, and studies usually externally optimize them in order to achieve specific research objectives. In the study the most effective methods is to do research with multivariate regression analysis theory, and make effective analysis on the internal relations between the performer and the listener. The specific relations can be divided into the following two[4].

The first is that the performer is able to effectively express his/her intention to perform, thus to form corresponding relation with the clues. The second is that listener is able to make valid judgement on the intention of the performer. The multivariate regression analysis method can effectively express such complicated communication process, thus to make the relationship between the two can be effectively stated with concepts, and to continuously improve the utilization efficiency of the clues.

THE LENS MODEL EQUATION

From the collection and collation of the literature a corresponding proof conclusions can be drawn, which is that the regression model between the performer and the listener model can be combined with lens model equations to build a mathematical model. While this view initially was produced by Hammond, in an article about human judgment. The study of these documents is aimed to effectively combine the human cognitive systems and the description function of determining the task, and this theory can also be used in the field of emotional communication in music. In the lens model, the so-called achievement means that the accuracy of the exchange process can be guaranteed, and it is decided by wether the performer can effectively express his/her intention during the performance, as well as wether the listener is able to effectively determine the performer's intention. However the performer's expressing process of emotional intention during the performance can be divided into two parts, and the conscious expression can be defined as 1, and all the others can be defined as 0[5]. And the

listener's own judgment can make effective emotional level evaluation of the performing process, and the evaluation score can be expressed as continuous. High achievement in a certain emotion indicates the the high achievement of the performer's own, and the listener can carry out effective assessments to the achievement, and the score given are high and therefore there is a high degree of correlation between the score and the achievement.

As can be seen from the equation of lens model, two factors determine the results of r_a. The first factor is the linear factor, this factor was represents the linear regression model f_1 between the performer and the listener. And it expresses the degree of matching between I and Rs and the function G. I represents the consistency between the performers, then forms corresponding consistency between the performers' intentions and the clues. And Rs represents the consistency between the listeners, including the consistency between the listeners' judgments and the clues. These two indicators both effectively reflect the degree of matching between the linear regression model and the clues, and during the process of judging the using of clues is the common indicator. However when the range of R is 1, then the using of the clues can remain in exactly the same state. The matching is the most important factor between performer and listener, and is usually written as B. It is also the evaluation indicator of the interaction on a certain clue between the performer and the listener during the performing, and it can be acquired from the predicted value of the performer's regression linear model and the listener's regression model. However this acquisition process of the indicator can usually be identified as maintaining a high degree of consistency between the performer and the listener when the regression model between them are able to reach a perfect level. G and Re, G and Rs remain relatively independent.

$$r_\alpha = G \ \text{Re} \ Rs + C\sqrt{(1-\text{Re}^2)}\sqrt{(1-Rs^2)}$$

If the emotional exchange is not successful in the study, possible reasons are: (1) the performer and the listener use different codes (low G); (2) the performer uses codes that does not match (low Re) and (3) the listener uses codes that does not match (low Rs). These three factors constitute a ceiling on achievements. Through separate analysis, we can know how to improve the accuracy of music information exchange.

The second part of the lens model is the exchange process, and is usually not typical. This part mainly contains the systematic variance and the non-system variance that the linear part can not resolve[6]. This part correspondingly calculates the different influence of the using of the clues, and these influential factors include elements like memory lapses and memories scattering. (1-Re) and (1-Rs) respectively represent the left variance of the regression model between the performer and the listener, the meaning of C is the left variance between the performer's regression model and the listener's regression model, if the value of C is large, the regression model has no dependence on the clues.

EXISTING CLASSIFICATION OF MUSIC EMOTION MODELS

Music mood classification is the first step in the analysis of music emotion, related discussion has been done and several common models have been formed both in the field of music and computer, there are two models now recognized as good ones, the Thayer model and the Hevner emotion circle, which will be described below.

The thayer model

From the perspective of pressure and energy the Thayer model describes the emotion of music and forms a 2-dimensional space. As shown in Figure 3, based on the difference of the two dimensions, the Thayer models divides emotions into four parts: satisfaction (low stress, low energy), depression (high pressure, low energy); vitality (low stress, high energy), desire (high stress, high energy) [7].
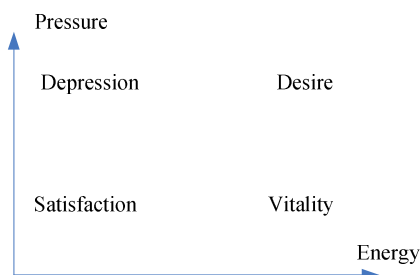

Figure 3 : The thayer model

The hevner emotion circle

The Hevner emotions circle is the most widely recognized among the music emotion classification system, it divides emotions into 8 categories, each contains some subclasses that are similar but different from each other. As shown in Figure 4, the 8 categories of the Hevner emotion circle form a circular, because in a piece of music, the flow of music emotions tend to follow the Hevner emotions circle. The classification of the Hevner emotion circle is very detailed and follows the law of emotion flowing, so it has been widely recognized by music psychological researchers.
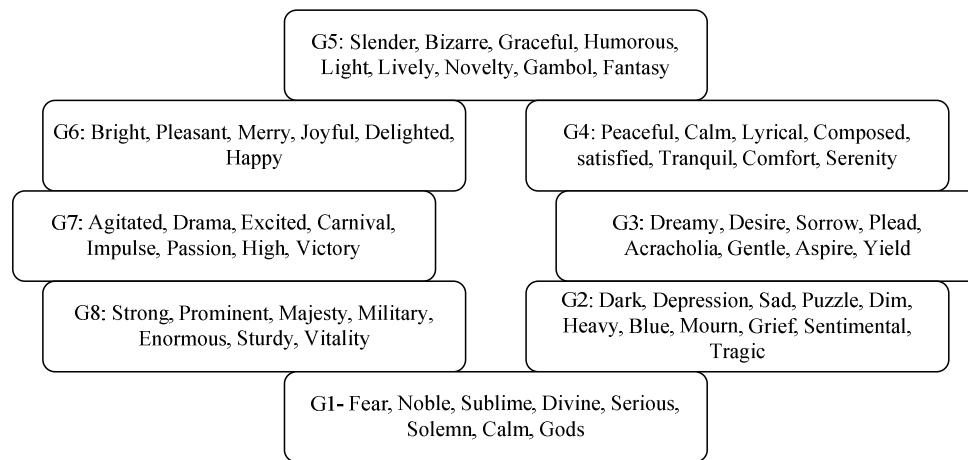
G5: Slender, Bizarre, Graceful, Humorous, Light, Lively, Novelty, Gambol, Fantasy

G6: Bright, Pleasant, Merry, Joyful, Delighted, Happy

G4: Peaceful, Calm, Lyrical, Composed, satisfied, Tranquil, Comfort, Serenity

G7: Agitated, Drama, Excited, Carnival, Impulse, Passion, High, Victory

G3: Dreamy, Desire, Sorrow, Plead, Acracholia, Gentle, Aspire, Yield

G8: Strong, Prominent, Majesty, Military, Enormous, Sturdy, Vitality

G2: Dark, Depression, Sad, Puzzle, Dim, Heavy, Blue, Mourn, Grief, Sentimental, Tragic

G1- Fear, Noble, Sublime, Divine, Serious, Solemn, Calm, Gods

Figure 4 : The hevner emotions circle

CONCLUSION

Above is the discussion and exploration of the lens model in music emotion communication. This study combines Brunswick's lens model with the improved lens model and the lens model equation, and introduces current musical emotion classification models to show the research value of this study. We hope the research and discusseion of this study can be a solid basis for the effective development of the following research work.

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