

## LETTER TO THE EDITOR

## Modeling and Analysis of the Impact of Regional Characteristics on the Eco-Environment of Musical Culture

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In order to solve the problem that the traditional ecological environment evaluation model has low fitting degree between the results obtained and the actual results, a model of the impact of regional characteristics on the ecological environment of music culture based on grey relational analysis is proposed. This paper analyzed the impact of natural factors on the ecological environment of music culture, analyzed the impact of human factors on the ecological environment of music culture from the aspects of historical and cultural background and folk customs, and constructed the correlation model between regional characteristics and the ecological environment of music culture by using grey correlation method. The experimental results show that the results of the model and expert scoring results fit well, which verifies the comprehensive practicability of the designed model.

Regional Characteristics; Musical Cultural Ecological Environment; Impact Model; Grey Correlation Analysis

### 1 INTRODUCTION

After entering the new century, the protection of the natural environment has become a common problem for all mankind, and has almost become the theme of literary and artistic creation. Today, people have been strongly aware that the market economy has put all forms of human activities on the balance of commodity value to measure, making the music art seriously secularized. The destruction of the natural ecological environment and the environmental crisis have brought about the crisis of human spirit to varying degrees. The vitality of human being drawing strength from nature has weakened, and the function of music has weakened to make people get rid of material and secular fetters. It has gradually become a purely utilitarian thing. Therefore, it is very important to construct a good musical cultural ecological environment.

“Ecology” is not only a biological term, but also a philosophy, a systematic science of the relationship between organism and environment, including human beings. In 1866, German zoologist Hacker defined “ecology” as “the relationship between organism and surrounding environment”. He extended the ecological theory from the field of natural science to the field of Social Sciences and further extended it to the music ecological environment, which could effectively solve the problem of secularization of music culture and improve people’s spiritual realm. No regional geological, geomorphological and natural landscape factors can exist alone in any region. These factors are closely linked by intricate relations. Therefore, when studying the ecological environment of music culture, we must conduct a comprehensive and in-depth investigation and research on the natural environment, scientifically and professionally analyze the relationship and impact of these natural characteristics on the ecological environment of local music culture, and on this basis carry out relevant work in order to achieve the harmony and

unity between natural ecology, music cultural ecology and people's production and life. Many researchers have studied the ecological environment of music culture. The results are as follows:

Li Ma published an article in the Journal of Ekoloji 2019 Issue 107 entitled "Traditional Music Protection System from the Ecological Perspective based on Big Data Analysis", a new idea for exploring the heritage and development of traditional music. From the perspective of ecology, the current situation of traditional Chinese music in the era of big data is further studied through data analysis and investigation of the living conditions of specific types of music and the protection of traditional music databases (Ma 2019). This article shows that with the changes in information media technology and society, the development of traditional music is declining and facing a crisis of survival. Only through the reform represented by "Xinmin Music", the support of local literary and art groups, the cultivation of young local music talents, and the integration of comprehensive arts with film and television dramas can we continue to expand the living space of traditional music and adapt to the needs of the development of the times. Therefore, this article proposes to actively utilize the tremendous development opportunities and platforms provided by the information age. In this process, in order to adapt to the needs of the times, it is necessary to change the original content. Under the premise of maintaining the artistic quality of traditional music, further expanding its space for survival and development, sublimation on the basis of the original, it has a positive historical significance. However, this article has limitations, and there is no in-depth study of the musical culture and ecological environment.

Wang and Sun (2017) propose a model of the impact of human factors based on state space on the ecological environment of music culture. By using the method of quantitative evaluation of ecological carrying capacity-state space, it constructs a model of the impact of human factors on the ecological environment of music culture, calculates the comprehensive index of the impact of human factors on the ecological environment according to the model, compares it with the critical value, and judges that the impact of human factors on the ecological environment of music culture in this area is moderate, critical or excessive. However, this method is too simple and has the problem of low fitting between the results obtained and the actual results. Xing et al. (2016) present a model for evaluating the impact of shale gas development on ecological environment based on pressure response. Aiming at the special development mode of shale gas and the difficulty of EIA is greater than that of conventional gas, an evaluation index system of the impact of shale gas development on ecological environment is established by using the "pressure-state-response" framework model. Introducing the method of curve projection and combining the projection pursuit method with the dynamic clustering method, the quantitative evaluation method of curve projection pursuit dynamic clustering is put forward; the best projection direction is found based on the curve projection and dynamic clustering method of each index of sample, and the corresponding optimization model of ecological environment impact assessment is established; combining the global optimal experience guidance and pheromone exchange, the improved method is adopted. The improved ant colony algorithm is used to solve the optimization model (Liew et al. 2019). However, the model has the problem of low fitting degree between the results obtained and the actual results, which is difficult to apply to real life.

Aiming at the problems of the above methods, a model of the impact of regional characteristics on music ecological environment based on correlation analysis method is proposed.

## **2 PERSPECTIVE**

### **2.1 Analysis of the impact of natural factors on the eco-environment of musical culture**

The existence of geological features will cause the surface to appear undulating. After years of evolution, certain settlements will be formed. Different geomorphology will produce different customs, and the culture and music expressed by them will not be the same (Gong et al 2017). Natural scenery is the basis for people to make music

creations. It not only makes music creation unique in geography, but also makes music genre rich and colorful. Different natural landscapes can reflect different regional characteristics (Xie 2019). Due to the differences in climates between different regions, the natural scenery growth environment is also different, so its growth characteristics will also be different. Under normal circumstances, the hydrological environment is a direct factor affecting the growth of landscape vegetation, and it also has a certain decorative effect, which is an important source of ecological music creation (Morgan 2016). Therefore, in the construction of music culture environment, we must give full play to the important role of many natural factors, and use the uniqueness of natural geographical environment to construct an excellent music culture ecological environment.

## **2.2 Analysis of the impact of humanistic factors on the eco-environment of musical culture**

### **2.2.1 Historical and cultural background**

Human survival in historical and cultural contexts is its most intuitive reflection and the basis for building a musical cultural ecological environment (Dunkley 2016). Therefore, it is necessary to apply historical and cultural rationally and fully to reproduce historical and cultural landscapes, such as applying historical and cultural allusions to music creation, so that the audience can understand the local history while enjoying beautiful music. Cultural heritage, which in turn increases people's emphasis on history and culture, is conducive to the construction of music culture ecological environment. In addition, all kinds of buildings in the landscape can be expressed by adding words or rhythms, visually indicating the historical process, and then highlighting the characteristics of the ecological music culture and enhancing the historical thickness of the music ecological culture.

### **2.2.2 Folk customs**

Folk custom refers to the life culture created, enjoyed and passed down by the vast majority of people in a country or nation. It originated from the needs of the life of human society groups, continuously formed, expanded and evolved in specific nationalities, times and regions to serve the daily life of the people. Folk custom is such a basic force that comes from the people, inherits from the people, regulates the people, and lies deep in the people's behavior, language and psychology (Quick et al. 2017). Folk custom is the most intimate body and mind culture in the culture of the people. It is also a concentrated reflection of a national culture. It is also the source of music creation. It uses folk customs to create a musical and cultural environment with traditional folk colors and promote folk customs. At the same time, improve the appeal and influence of the music ecological culture.

## **2.3 The impact of regional characteristics on the ecological environment of musical culture based on grey relational analysis**

Grey relational analysis is the basis of the grey system theory and is a systematic analysis method. Grey correlation analysis is a quantitative description and comparison method for the development of system changes (Shao et al. 2016). It is based on the mathematical basis of space theory, according to the four axioms of grey relativity, i.e. normality, even symmetry, integrity and proximity, to determine the correlation coefficients and relativity between the reference sequence and several comparative sequences.

The purpose of grey relational analysis is to find out the main relationship among the factors in the system and the important factors affecting the target value, so as to grasp the main characteristics of things and promote and guide the rapid and effective development of the system. Grey system correlation analysis is essentially the analysis of correlation coefficient. Firstly, the correlation coefficients of each scheme and the ideal scheme composed of the best indicators are calculated, and the correlation degree is obtained by the correlation coefficient. Then, the correlation degree is sorted and analyzed according to the size of the correlation degree, and the conclusion is drawn. This method breaks through the constraints of traditional precise mathematics which cannot be allowed to be ambiguous. It has the characteristics of simple principle, easy to grasp, simple calculation, clear ranking, no

special requirements for the types of data distribution and the related types of variables, so it has great practical application value. Especially under the support of computer science and technology, those have no or little relationship with mathematics. It is possible for disciplines to be described and dealt with quantitatively and mathematically, thus greatly expanding the scope of application of this method.

Grey correlation analysis, from the point of view of its ideological method, is to judge whether the sequence curve is closely related according to the similarity of geometric shape. The closer the curve is, the greater the correlation degree between the corresponding sequences is, and vice versa, the smaller the correlation degree is. The gray correlation analysis method is used to analyze the impact of natural factors and human factors on the ecological environment of music culture. Assuming that the natural factors, historical and cultural background and folk customs are K1, K2 and K3 respectively, the concrete steps of using correlation analysis method to analyze the impact of these four factors on the music ecological environment are as follows:

- 1) Determine the reference sequence and the comparison sequence.
- 2) Dimensionalization of primitive sequence. In order to reduce the error probability of analysis and recognition, it is necessary to dimensionalize the characteristic parameters of different dimensions and adopt data interval dimensionalization before calculation.
- 3) Calculate the grey correlation coefficient, the formula is as follows:

$$\xi_{ij}(k) = \frac{\Delta_{\min} + \rho\Delta_{\max}}{\Delta(k) + \rho\Delta_{\max}} \quad (1)$$

Determine the resolution coefficient. For this reason, the mean value of correlation space comparison and the proportional coefficient of mean value are defined as:

$$\bar{\Delta} = \sum_{k=1}^n |x(k) - y(k)| / n \quad (2)$$

$$\gamma = \bar{\Delta} / \Delta_{\max} \quad (3)$$

- 4) The grey relational degree model is as follows:

$$r_i = \frac{1}{n} \sum_{k=1}^n \xi_{ij}(k) \quad (4)$$

- 5) Evaluation and analysis. According to the gray correlation degree, the four factors affecting the ecological environment of music culture are sorted. In this way, the impact of regional characteristics on the ecological environment of music culture is modeled.

### 3 RESULTS

In order to verify the comprehensive effectiveness of the proposed model based on the grey relational analysis on the eco-environment of musical culture, it needs to be tested by MATLAB7.0 software. The operating system is Windows XP and the memory is 24 GB. In order to break the limitation of Li Ma's method, we test the correlation between regional features and music ecological environment, 50 experts in related research fields are searched to score the correlation between regional characteristics and music ecological environment. The fitting degree of the expert evaluation results is compared with the research results of this paper. The results show that the model has a high degree of fitting with the expert scoring results, and the validity of the designed model is verified.

### 4 DISCUSSION

(1) Because Li Ma's article is not comprehensive, there are still some limitations. Therefore, a model of the impact of regional features on music culture ecological environment based on grey relational analysis is proposed. The experimental results show that the results of the designed model are obtained. The main reason for the fitting with the expert scoring results is that the designed model uses the gray correlation analysis method is superior to the classical precise mathematical method. After conceptualizing and modeling the intentions, viewpoints and requirements, it gradually evolves from the structure, model and relationship. From black to white, the unclear factors are gradually clarified, and its application to the study of the influence of regional characteristics on the music culture ecological environment can greatly improve the accuracy of the research results.

(2) The next step of the research work is to carry out the study of ecological philosophy. The main reason is that the research object of ecology has expanded from the biological level to the humanities, which raises the theoretical vision and research perspective for the study of music ecological aesthetics. The emergence of ecological philosophy provides a basis for grasping the basic features of multi-musical culture from a higher theoretical level. More importantly, there is a close theoretical relationship between ecological philosophy and post-modernist philosophical trend of thought. At present, the study of post-modernist music culture is gradually moving towards ecological philosophy.

## 5 CONCLUSION

Music in the realm of ecological rationality is actually the experience of the whole life spirit of the system. It is the experience of human perceptual life, social and spiritual activities, and even the deep structure of human soul. Through the balance mechanism of human spiritual and spiritual ecology, the feedback to the experience of human's emotional life, and the feedback to the harmonious relationship between human and natural ecology, this paper proposes a model of the impact of regional characteristics on the ecological environment of musical culture based on grey relational analysis. The experimental results show that the results of the model designed have a higher degree of fitting with the results of experts, which indicates that the model is suitable for the ecological environment of musical culture. It has a very high comprehensive practicability, which lays a foundation for the progress of research in this field and promotes the healthy development of ecological music culture.

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