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Abstract: The uncertainty in Chinese traditional music texts has made it possible to inherit the music texts flexibly and creatively. Contemporary information philosophy and complex information system theories reveal the complexity, diversity and ambiguity of human cognition, providing a philosophical and scientific methodology for analyzing complexity issues in different fields. Based on studies on information philosophy and complex information system theories, this paper will discuss Xi’an Drum Music texts and the complex information in its inheritance in order to analyze the significance of uncertainty in inheriting Chinese traditional music.

Keywords: ancient music text; way of inheritance; chaos and fractal; complexity

1. Introduction

Chinese musical notation does not have accurate quantification of pitch and rhythm and trans-code digital symbols, nor does it form a normative system of independent expression, speed and strength such as the Europa notation. The uncertainty in Chinese traditional music texts has made it possible to inherit the music texts flexibly and creatively. Contemporary information philosophy and complex information system theories reveal the complexity, diversity and ambiguity of human cognition, providing philosophical and scientific methodology for analyzing complexity issues in different fields.

2. Chinese Traditional Music Texts and Theories of Chaos and Fractal

The heaven–human integration theory in ancient Chinese philosophy emphasizes the unity of man and nature. Such thoughts are very prominent in the creation and inheritance of ancient Chinese music. The fractal and chaos theories are a portrayal of nature. Additionally, music, as a subsystem of nature, fully complies with such laws embodied in the fractal and chaos theories.

Classical scientific theories hold that things in the world are interrelated and moved through linear interactions, and the laws of movement are always characterized by simplicity and rigid determinism. However, with the development of science, especially the development of fractal and chaos theories, people have gradually revealed the nature of nonlinearity, complexity and indeterminism during the interaction and movement of things.

As part of the creative arts produced by human beings, music is inherently unified in its tectonic principles and natural principles, showing evident characteristics of fractal and chaos. Fractal makes people aware of the fusion of science and art and the aesthetical unity of mathematics and art. With the development of science, art and science are associated. It has a profound significance of scientific methodology and philosophy that musical phenomena are analyzed from the perspective of fractal and chaos, which are popularly emerging theories and sciences.

Fractal appeared early in mathematics, but because of cognitive limitations, has long been regarded as a “pathological curve” and rejected by classical geometry. Until the mid-1970s, B.B. Mandelbrot, a French mathematician, formally established fractal
geometry incorporated with studies of chaos phenomena. Fractal and chaos theories have changed human beings’ cognitive ways, revealing the essence and mystery of the world and allowing human beings to re-understand the basic formation and evolution ways of nature featuring indeterminism as nonlinearity, disorderly and orderly compatibility, cross-level similarity and path bifurcation and so on. Pervasive as they are, fractal and chaos are basic characteristics of natural construction.

Something combining certainty and uncertainty is featured with such a mixed property. The certainty of a fractal can be understood as having similar patterns at different levels, which in itself has its certainty. Uncertainty is a pattern of differences based on the range of the pattern itself or something else, which in itself is uncertain. There is another pattern that the differences between different levels are not exactly the same, which is also uncertain.

Chaos and fractal theories reveal special phenomenal patterns such as nonlinear existence, ambiguity, randomness development, fragmented assemblage and irregular essence of the objective world, which are mixed characteristics, including certainty and uncertainty. Using chaos and fractal theories to analyze the inherent structure and connotation of a complex information system plays an important role in revealing its essential meaning.

3. Chaos and Fractal in Ancient Musical Texts and Its Inheritance

Chinese traditional music [3] shows the coexistence of certainty and uncertainty both in musical score form and inheritance style, which is in line with the complexity of complex information systems theory, namely, the theory of nonlinear system.

On the basis of nonlinear theory, chaos theory is “a kind of science concerning process and evolution, rather than state and existence [4] (p. 56).”. Additionally, the “process” and “evolution” are two of the most important characteristics of Chinese traditional music, embodied in the music texts as well as its inheritance. Perhaps inherent laws and essential characteristics of Chinese traditional music can be revealed through the lens of chaos and fractal theories.

Chaos and fractal theories are based on “generative theory”, which shows human beings a new world of “complexity”, “multiplicity”, “temporariness” and “limitation”.

There are differences in the characteristics of musical score texts of traditional Western and Chinese music. Western traditional music texts are based on the original creation of the composer. For future generations to perform or practice, they must respect the composer’s original creation and cannot change the music score at will. It is inherited with certainty or rigidity. If we treat each performance of Western traditional music as a level and superimpose these levels, we will find this distribution to be “evenly distributed” because there are no essential changes with every musical performance practice.

The music score of Chinese traditional music is itself compatible with both certainty and uncertainty due to its frame and implication. However, when the performers or the inheritors practice the score, because of the intervention of the hidden experience such as subjective character, such a situation may occur that different people perform or practice very differently while referring to the same version of the score. Similarly, if Chinese traditional musical score texts are rewritten in a popular stave or numbered musical notations (each rewritten as a level, and these levels superimposed), then we will find out that there must be changes, which should be “unevenly distributed”. Each generation of the texts has both similarities and differences after re-writings.

Let us take the music text of Xi’an drum music [5], for example. In the traditional Xi’an drum music, the music score is settled, which means that the pitch is settled. Except for the settled pitch, the music score also exhibits the “plank beats” structure. However, the exquisite rhythm would be expressed through the vocal and instrumental performance of the music score. Thus, the inherited system is also a dynamic evolutionary system. The Xi’an drum music is a more advanced system model that is gradually processed and transformed by posterity. This model has some self-similarity with the original model, but they also have some differences. A new form is evolved from the original system during the development, and this new form grows some new features based on some
fixed factors of the original system. We call the evolutionary process of the new system inheritance. Meanwhile, the bifurcations also happen during the evolutionary process, and those bifurcations are different styles and modalities produced by different inheritors.

The folk music “Flowers”, which is popular in Qinghai province, China, also has the same characteristics. The basic melody of “Flowers” could be uniform, but the lyrics can have different contents. Otherwise, the basic melody could also be altered, but the positions of strong beats cannot change, while the middle grace note could vary along with the habits of performers.

Interweaving the certainty and uncertainty during the inheritance of an ancient music score establishes an explicit example that explains the necessity of a philosophical understanding of using chaos theory and fractal theory to deal with a complex information system. The process of inheriting ancient music scores is also a dynamic process, which is full of certainties and uncertainties. Additionally, the exploration of the nature and prediction of development with such a dynamic process agrees with the explanation of chaos theory and fractal theory on the objective world, which approaches the authentic nature of artistic creation and inheritance.

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References
1. Wu, K. *The Theoretical Basis of Complex Information System*; Xi’an Jiaotong University Press: Xi’an, China, 2010.
2. Guan, J. *The Cultural Horizon of Chinese Music Aesthetics*; Nanjing University Press: Nanjing, China, 2013.
3. Wang, Y. *A Music Score Study of Chinese Traditional Music*; Fujian Education Press: Fuzhou, China, 2006.
4. Jiang, W. A Study on the Relation among Chaos, Fractal and Music. *New Voice Yue-Fu* 2004, 3, 11–19.
5. Li, S. *The Pandect of Xi’an Drum*; Culture and Art Press: Beijing, China, 2009.