

ISE 599 paper review

Title: Tempo and Loudness Analysis of a Continuous 28-Hour Performance of Erik Satie's Composition "Vexations"

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Reviewer: Jie Liu

This paper shows a very interesting experiment as well as its results. They have one pianist play a short piece, which is "Vexations", for 840 times and use this 28-hour performance as an example of long-term performance to explore some tools and methods. They did not get much convincing results, since this research is very new and it is only one step toward an unknown field, but the efforts they made and the methods and tools they used in this paper have provided a clear direction and a strong base for the future research.

John Cage once organized a complete and public performance for "Vexations" in 1963, but 9 pianists participated in this performance, which left a discussion of the difference between team performance and solo performance. In this paper, they set up their experiment by having only one pianist play this piece. What they are interested are the changes of tempo and loudness in this extremely long performance. After recording the IOI and loudness data, they plotted the tempo graph, loudness graph and the tempo-loudness trajectory.

From the tempo graph, they found that the average tempo is stable in the first 14 hours, and the appearance of the instability is coincided with the trance state of the performer. Moreover, after 19 hours, the tempo stability can not be re-established. Hence they proposed that consciousness might have a strong influence on the average tempo stability. From the loudness graph, we can see that the average loudness is overall continuous and decline in the first 18 hours. There is a high instability appearing at the end of the trance section, and the beginning of the trance state does not affect the average loudness. An observation is the instability of tempo does not match the instability of loudness. The tempo-loudness trajectory is like a wool ball with threads, and we can not see "the faster the louder, the slower the softer".

The performance is apparently repetitive. If it is played by a machine, the tempo and loudness graphs would be exactly cyclic. However, because of the human performer, the performance is considered as quasi-periodic. The second part of the paper is trying to answer those questions: Since every cycle in the performance is different compared with others, where does the difference come from? Is it deterministic or random?

Several time series analysis methods are applied in this paper, including linear analysis and non-linear analysis. Through the linear analysis, three periods from three different levels are found. It is easy to explain the period in the note level, as well as the piece level. However, there is a large-scale period, which is approximately equal to 5 or 10 cycles of the whole piece. The authors explained that the reason might be the physiological ultradian oscillations.

From the results of non-linear analysis, including calculating the embedding dimension, the correlation dimension and the Lyapunov exponent, the authors showed that the difference between those repetitive performances is not just noise, but chaos, which means deterministic but non-predictable. They mentioned that a “performance generator” might exist, controlling the periods of long-term performance. However, currently there is no research supporting their guess.

In sum, there are 6 points mentioned in this paper: (1) the analysis of tempo and loudness fluctuations shows that an influence of endogenous processes on the long-term shaping of expressive parameters, (2) “Vexations” is an exploration to the long-term performance research, (3) it is possible to apply linear and non-linear tools to analyze long-term performances, (4) comparison of performances of different artists should be carried out later, (5) findings in this paper contribute to the understanding of complex artistic processes, and (6) tempo-loudness trajectory is a promising way for this research.

Here are some of my comments after I finished this paper. The methods and tools used in this paper gave me a very fresh idea. I think analyzing this repetitive long-term performance from the view of time series signal is right. They did apply some new methods to the field of music performance and I believe more results could be explored later. However, it still needs a lot of work to find out those factors behind this quasi-periodic performance, and even more work to analyze or quantize them. I think it is plausible to explain the reason of the large-scale period as the ultradian oscillation, but to prove this, convincing results are needed. Also, I think the research of this long-term, repetitive and “boring” performance is a little bit beyond of the range of music performance, and I guess the real important work lies in other fields, such as neuroscience and medical science.